The Value Relevance of Losses Revisited: The Importance of Earnings Aggregation

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JEL Classification Code: M41 Accounting

Key Words: Value Relevance, Earnings, Cash Flow, Accruals, Loss

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Abstract
Prior research has suggested that earnings explain a larger portion of the variation in stock returns when disaggregated into components. This study shows that the increase in explanatory power stems primarily from disaggregation of *negative* earnings. When accounting earnings are sufficiently disaggregated into items, there is no longer a statistical difference in the value relevance of positive and negative earnings. Thus, negative earnings are also useful to stock investors. The findings are attributed to earnings persistence; even if losses are not persistent on an aggregate level, it may be the case that individual earnings items can provide information with respect to the future cash flow-generating capabilities of the firm.

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1 Introduction

Several studies propose that negative earnings (losses) have a very low association with contemporaneous stock returns (Basu, 1997; Darrough and Ye, 2007; Hayn, 1995; Joos and Plesko, 2005). The explanations for this phenomenon are generally related to earnings persistence. Negative earnings are not expected to persist and therefore provide little or no information about the future performance of the firm. Most studies assume, at least implicitly, that there is a close association between earnings persistence and earnings' value relevance. However, even if earnings are not expected to be persistent on an aggregate level, it may still be the case that earnings *components* are persistent. Hence, if earnings are disaggregated into items, some of these items may be value-relevant even if bottom-line earnings are negative. A large number of studies (e.g., Barth et al., 2005; Barth, Cram, and Nelson, 2001; Carnes, 2006; Ohlson and Penman, 1992) present evidence that the value relevance of return regressions increases when earnings are disaggregated into items. For instance, Ohlson and Penman (1992) find that the explanatory power of their regressions is 80% higher when earnings are disaggregated into seven items than when aggregated bottom-line earnings are applied. The findings are consistent with Pope's (2005) assertion that earnings components generally do not "add up" in valuation. My study proposes that the usefulness of earnings disaggregation is dependent on the sign of bottom-line earnings. I hypothesise that the relative increase in value relevance is larger for negative than for positive earnings. Disaggregation of negative earnings may reveal that even loss firms report persistent earnings items. I expect the value relevance of profit firms to increase as well, but as positive earnings on an aggregate level also tend to be persistent, I expect the relative usefulness of disaggregation to be smaller for this group of firms. Overall, the study provides strong evidence in support of the hypothesis.

The proposed hypothesis is general in nature and likely to be independent of the accounting regime investigated. However, to analyse if the hypothesis holds under different sets of accounting rules, I have chosen to study one of the many countries that has changed accounting regimes over the past few years. This allows me to test the generalisability of the findings without having the conclusions exposed to institutional, legal, cultural and other country-specific factors known to affect the value relevance of accounting information substantially (Ali and Hwang, 2000). Among several possible candidates, I have, for a number of reasons, chosen to conduct all analyses on a Norwegian sample. As all members of the European Economic Area (EEA)[i], Norway had to switch accounting regimes from local Generally Accepted Accounting Principles (GAAP) to International Financial Reporting Standards (IFRS) from 2005 and onwards. However, in several European countries, for instance, Sweden and Denmark (Hamberg, Novak, and Paananen, 2010; Thinggaard and Damkier, 2008) the switch in accounting regimes was gradual, making it impossible to set a specific cut-off year for the change in accounting regulations from local GAAP to IFRS. In contrast, Norway chose to not incorporate any international standards in Norwegian GAAP (hereafter NGAAP) prior to 2005, making 1 January 2005 the unambiguous moment for the change in the accounting regime. Further, NGAAP's earnings-oriented focus (Gjerde, Knivsflå, and Sættem, 2008), contrasts other local GAAP, for instance, UK GAAP (Pannanen and Parmar, 2008), for which there has been a development towards a balance sheet focus. This makes NGAAP a particularly interesting benchmark for the balance sheet-oriented IFRS. Other European countries with earnings-oriented accounting systems typically have strong remaining links to tax accounting, a tradition abolished decades ago in Norway. The strong links to tax accounting in continental Europe often lead to highly biased accounting estimates (Alexander & Archer, 2003). Finally, Norway represents a stable environment of relatively high investor protection and strict legal enforcement (La Porta et al., 1998), which induces a

low and stable level of earnings management and more informative disclosures than in EEA countries with lower investor protection (Leuz, Nanda, and Wysocki, 2003; DeFond, Hung, and Trezevant, 2007).

I perform all empirical analyses separately on an IFRS and an NGAAP sample, and these samples are further split into positive and negative earnings sub-samples. The results show that in both the IFRS and the NGAAP sample, the explanatory power of the negative earnings companies is zero when stock returns are regressed on accounting earnings, a finding consistent with Hayn's (1995) classical study. However, as earnings are disaggregated, there is a significant increase in the explanatory power of the negative earnings samples. In fact, when earnings are sufficiently disaggregated, there is no longer a statistically significant difference in the value relevance of the positive and negative earnings samples. Thus, the conclusions of prior research that found that income statement information is value-irrelevant when firms report a loss (Basu, 1997; Hayn, 1995) may be premature. Instead, the accounting information can be equally useful for stock investors when earnings are negative. The investors simply have to dig deeper; the useful information is embedded in earnings items rather than in bottom-line earnings. The findings appear robust and generalisable; the study's conclusions hold not only under two rather different accounting regimes, but they are also valid within the constraints of the world's most frequently applied accounting regulations, the IFRS.

The remainder of this paper is organised as follows: Section 2 presents relevant prior research and develops the hypothesis to be tested. Section 3 outlines the research design of the study and describes the data sample employed. This section also includes a brief discussion of

major differences between NGAAP and IFRS. Section 4 presents the empirical findings and discusses a large number of robustness checks. Section 5 concludes.

2 Theoretical background and hypothesis development

One of the classical studies on the value relevance of losses is performed by Hayn (1995). Hayn (1995) presents evidence that positive earnings are far more value-relevant than negative earnings. In fact, she concludes that negative earnings hardly are value-relevant at all. She attributes her findings to the liquidation option held by stock investors. When companies with negative earnings exist and are not liquidated, it must be the case that investors expect that the negative earnings will not persist. Positive earnings, on the other hand, are generally much more persistent. Several explanations for the low value relevance of losses are presented in the value relevance literature. Most of these are also discussed by Hayn (1995): accounting conservatism (Basu, 1997), earnings mean reversion (Freeman, Ohlson, and Penman, 1982), negative correlation between earnings persistence and earnings changes (Freeman and Tse, 1992), and losses are driven by special items (Stunda and Typpo, 2004). All explanations are related to earnings persistence, and they are not mutually exclusive. Company value is the present value of future cash flows (or earnings). If the current earnings level is a poor indicator of the future earnings level, the association between current earnings and company value will be low. Thus, the general reason for the low value relevance of negative earnings is that negative earnings are not expected to continue. Hayn's (1995) liquidation option theory can be seen as one of several related explanations for the low persistence of losses.

The liquidation option theory has been questioned by more recent studies, for instance, by Joos and Plesko (2005) and Darrough and Ye (2007). Joos and Plesko (2005) find that losses

often are rather persistent, and that larger persistent losses actually can correspond to higher stock returns. Similarly, Darrough and Ye (2007) report that some firms suffer from what appear to be chronic losses, although they remain in business for many years. These two studies can be seen as evidence against the liquidation option theory. Joos and Plesko (2005) present evidence that losses are often driven by R&D expenditures rather than transitory losses. R&D is to be expensed under conventional GAAP even though the expenditures can be seen as an investment that will increase the future profitability of the firm. Consequently, Joos and Plesko (2005) suggest that investors separately value the R&D component of a loss as an asset and the non-R&D component as if it is a transitory loss. Darraough and Ye (2007) reach similar conclusions and find that the increase in the number of loss firms is closely associated with the increase in the number of small firms that engage in risky R&D projects that do not produce current profits. In addition, they report that firms with large losses sustain themselves with external financing based on hidden assets that are valued by the market. These hidden assets include activities such as marketing of brand names, developing human capital, establishing distribution channels, and cultivating supplier relationships. Darrough and Ye (2007) conclude that neither R&D nor other intangible, hidden assets is appropriately captured by most accounting systems.

Overall, Joos and Plesko (2005) and Darrough and Ye (2007) shed further light on Hayn's (1995) findings by showing that attributes of the accounting system may cause current earnings to be a poor indicator of future profitability. These studies show that losses may be persistent if some of the costs that cause the loss in reality are investments (for instance R&D expenditures). However, even if losses are expected to prevail for some time, the investors definitely expect that they will not continue indefinitely. The investments are expected to pay off eventually and the loss will turn to a profit. Thus, even if Darrough and Ye (2007) and

Joos and Plesko (2005) consider longer time horizons than Hayn (1995), the liquidation option theory proposed by Hayn (1995) is equally relevant for the cases discussed by Darrough and Ye (2007) and Joos and Plesko (2005). Because summed earnings are equal to sum net cash flows over the lifetime of a company, losses can under no circumstances be expected to be permanent and, hence, they are always expected to be transitory over a time period that may be very short or quite long. If negative earnings were expected to persist, stock investors would liquidate the firm rather than suffer from indefinite losses.

Joos and Plesko (2005) conclude their study by stating that investors do not consider losses to be homogeneous, but consider the causes and nature of the loss to assess its long-term implications for firm value (compare Pope's (2005) assertion that earnings items do not "add up" in valuation). Generally, prior research has shown that the value relevance of earnings may increase substantially if earnings are disaggregated into components (Barth et al., 2005; Barth, Cram, and Nelson, 2001; Carnes, 2006; Ohlson and Penman, 1992; Rayburn, 1986). This paper suggests that the usefulness from earnings disaggregation may be sign-dependent, and that it is relatively more useful to disaggregate negative than positive earnings. Specifically, I propose that even if negative earnings are unrelated to stock returns on an aggregate level, individual earnings components may contain significant amounts of value-relevant information. Individual earnings components may be persistent in cases where bottom-line earnings show little or no persistency. Such persistency may potentially be revealed if earnings are disaggregated. Financial statements can reveal value-relevant information even in loss cases, but one may have to dig deeper. Note that earnings disaggregation can also improve the return-to-earnings association for positive earnings companies. These companies may have earnings items with different valuation impacts as well. However, positive earnings are more often persistent on an aggregate level than negative

earnings. Prior research has shown that positive earnings are a significant explanatory variable for both future earnings (and cash flow) and contemporaneous stock returns (see, for instance, Jenkins, 2003). Thus, the *relative* usefulness of earnings disaggregation is expected to be lower for positive than for negative earnings. Therefore, I propose the following *alternative* hypothesis:

Hypothesis: Disaggregation of earnings information is relatively more useful for negative than for positive earnings.

Earnings may be disaggregated into line items (Carnes, 2006; Ohlson and Penman, 1992) or cash flow and accruals items (Barth et al., 2005; Rayburn, 1986). I focus on total cash flow and accruals items in this study. This partitioning is regarded as particularly interesting because cash flow generally is viewed as the objective part of the earnings number, whereas accruals are dependent upon accounting legislation and practice, as well as subjective judgment by accountants and managers. One may expect that investors regard losses driven by "real" cash flows as more negative than losses driven by "subjective" accruals that only partly materialise into future cash flows (Lev, Li, and Sougiannis, 2005).

3 Research design and data sample

3.1 Research design

The purpose of this study is to investigate whether or not earnings disaggregation affects value relevance differently depending on the sign of aggregate earnings. Value relevance is tested using regression analysis of stock returns on earnings components. All regressions are run on an IFRS and an NGAAP sample, and these are further split into positive and negative

earnings sub-samples. The explanatory power (the 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. The first regression model is a replication of Hayn's (1995) study, and stock return is regressed on aggregate accounting earnings (Model 1 = M1):

$$RET_{i,t} = \beta_0 + \beta_1 EARN_{i,t} + \varepsilon_{i,t} \quad (1)$$

$RET_{i,t}$ is stock return for company *i* in year *t*, while $EARN_{i,t}$ is aggregate accounting earnings. Easton and Harris (1991) demonstrate 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 are significantly related to stock returns (e.g., Francis, Schipper, and Vincent, 2003; Lev and Zarowin, 1999). Thus, I apply an Easton and Harris (1991) specification as my second regression model (M2):

$$RET_{i,t} = \beta_0 + \beta_1 EARN_{i,t} + \beta_2 \Delta EARN_{i,t} + \varepsilon_{i,t} \quad (2)$$

These two first regression models can be regarded as traditional value relevance regressions. In the third regression model (M3), earnings are split into cash flows and aggregate accruals where CF is total cash flows and ACC total accruals (see e.g., Ali and Hwang, 2000; Lev and Zarowin, 1999):

$$RET_{i,t} = \beta_0 + \beta_1 CF_{i,t} + \beta_2 \Delta CF_{i,t} + \beta_3 ACC_{i,t} + \beta_4 \Delta ACC_{i,t} + \varepsilon_{i,t} \quad (3)$$

Finally, in the fourth regression model (M4), total accruals are split into major accruals items (see e.g., Barth, Cram, and Nelson, 2001):

$$RET_{i,t} = \beta_0 + \beta_1 CF_{i,t} + \beta_2 \Delta CF_{i,t} + \beta_3 \Delta WC_{i,t} + \beta_4 \Delta\Delta WC_{i,t} + \beta_5 DEP_{i,t} + \beta_6 \Delta DEP_{i,t} + \beta_7 \Delta DT_{i\,i,t} + \beta_8 \Delta\Delta DT_{i,t} + \varepsilon_{i,t} \quad (4)$$

WC is working capital, exclusive of cash and interest-bearing debt, 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 (Easton and Sommers, 2003).

I use income before extraordinary items as my measure of aggregate earnings.[ii] Following prior research (Biddle, Seow, and Siegel, 1995; Finger, 1994; Klein and Marquardt, 2006), 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)
	-	Change in deferred taxes (ΔDT)
	-	Depreciation and impairment (DEP)

3.2 Data sample

The sample consists of firms listed on the Oslo Stock Exchange. In the IFRS sample, all accounting and stock price data is collected from Datastream. In the NGAAP sample, the 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 and stock splits/consolidations. Stock values and returns are measured at the 30th of December of each year.[iii] The IFRS observations are from 2005 to 2009, and the NGAAP 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, 1999). In addition, a major tax reform was implemented this year.

Consistent with prior research, financial firms are excluded from the data sample. Further, one observation is lost for each company when calculating change variables. 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 in the 1st and 99th percentiles of *RET*, *CF*, ΔCF, *ACC* and ΔACC, measured separately for the IFRS and NGAAP samples, 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 far less than the theoretical maximum of 10%. The final sample size is equal to 545 IFRS observations and 1,372 NGAAP observations.

There are some major accounting differences between the two samples. NGAAP are earnings-oriented rather than the balance sheet orientation of IFRS; see, e.g., Dichev (2008) for a general discussion.[iv] The earnings orientation focuses on the matching principle, meaning that assets are recognised in the balance sheet at transactional costs and depreciated to match the investment expenditures with future revenues, and liabilities are booked at nominal values. When the recoverable amount is less than the depreciated cost value, the asset value is, nevertheless, written down to the recoverable amount, securing balance sheet conservatism. NGAAP require the matching principle to be applied on the basis of unbiased

accounting estimates, e.g., the best estimate of asset lives and residual value. In general, IFRS have more recognition of assets and measurements at fair value than NGAAP. Increased recognition is related to intangible assets, especially purchased goodwill, which is not amortised, and capitalisation of development expenditures. Most financial instruments, biological assets and investments properties are measured at fair value under IFRS. NGAAP measure financial assets and debts at cost unless they are short-term financial instruments traded in a liquid market. For a more comprehensive discussion of the differences between NGAAP and IFRS, see Gjerde, Knivsflå, and Sættem (2008).

Descriptive statistics for the two samples are displayed in Table 1. Panel A presents data for the IFRS sample, while Panel B outlines descriptive statistics for the NGAAP sample. Data is displayed for the pooled samples, and for the positive and negative earnings sub-samples. The table reveals that average earnings scaled by the beginning-of-period market value of equity is close to zero for both the IFRS and the NGAAP samples. There is, by construction, a huge difference in mean earnings between the positive and negative earnings samples. Accounting earnings are comprised of cash flow and accruals. Cash flows are far larger for the positive than for the negative earnings samples. The low cash flow level is the main driver of the negative earnings. Depreciation is the most important accrual item. However, despite its rather low mean, the change in working capital has a substantial standard deviation and may thus be highly influential in the regression analyses. The difference between the positive and negative earnings samples for the change in working capital and the change in deferred taxes is moderate. Companies with negative earnings report the highest depreciations. Not surprisingly, there is a huge difference in stock returns between positive and negative earnings observations. In fact, the stock return is negative on average, both for the IFRS and the NGAAP samples, when earnings are negative. Data for total market value of equity is also

provided. The market value is applied as the deflation factor for all accounting variables, and is as such included in the regression analysis. The companies are relatively small on average, but some companies are considerably larger than the average. The loss companies are typically smaller than the profit companies, a finding consistent with Hayn's (1995) study.

[Insert Table 1 about here]

Table 1 also reports correlation coefficients for the IFRS and NGAAP samples, respectively. The correlation coefficients are computed separately for positive and negative earnings observations. Earnings, cash flow, and total accruals are significantly correlated with stock returns as long as earnings are positive. In fact, most earnings items appear to be statistically related to returns in the positive earnings samples. However, when earnings are negative, the correlations between the income data and stock returns are far lower. Aggregate earnings are uncorrelated with returns in both the negative earnings samples. Thus, the correlation matrices support prior studies' conclusions (Basu, 1997; Hayn, 1995) that income data has low value relevance when earnings are negative. Still, this bivariate analysis does not take into account possible interaction effects between the variables. We note that the accounting variables generally are significantly correlated with each other in all samples, although the deferred tax components often show up as uncorrelated with the other explanatory variables. The cash flow and the accrual component of earnings are always significantly negatively correlated. This is evidence that accruals, to some extent, balance out changes in cash flow and make total earnings a more stable figure than its separate components.

4 Empirical findings

The four regression specifications outlined in sub-section 3.1 are run on the positive and negative earnings samples, respectively. Separate analyses are provided for the IFRS and the NGAAP periods. The primary focus is, however, on the IFRS sample. I apply the adjusted R^2 as my measure of value relevance, but I also investigate alternative measures of explanatory power later in this section. Table 2 summarises the adjusted R^2 from the IFRS regressions.

[Insert Table 2 about here]

Table 2 shows that M1 – the aggregate earnings regression - is able to explain 11.92% of the variation in stock returns in the positive earnings sample. The adjusted R^2 is practically unaffected if the change in earnings is included in the regression, see M2. The explanatory power increases moderately in M3—to 12.76%—when earnings are disaggregated into cash flow and total accruals. As accruals in M4 are disaggregated into underlying items, the explanatory power increases to 13.36%. The explanatory power increases by 1.44 percentage points from M1 to M4. An F-test for restrictions on regression coefficients is performed to test the significance of the differences in adjusted R^2 (Barth, Cram, and Nelson, 2001, p. 42; Maddala, 2001, p. 155), and this test shows that 13.36% is insignificantly larger than 11.92% (not tabulated). [v] Thus, there is no significant difference in the explanatory power of M1, M2, M3, and M4 as long as earnings are positive. An identical analysis is applied for the negative earnings sample. According to M1, the adjusted R^2 is actually negative and equal to -0.52%. Although it hardly is meaningful to talk about negative explanatory power, we can conclude that M1 does not appear to explain any of the variation in stock returns when earnings are negative. If this specification had been the only regression specification that was used to investigate the value relevance of the two samples, the study would have concluded that negative earnings do not provide any useful information to stock investors whatsoever.

However, Table 2 illustrates that the explanatory power of the negative earnings sample increases consistently as earnings are disaggregated into components, and we move from M1 to M2, M3 and M4. The increase in explanatory power is dramatically higher in the negative earnings sample than in the positive earnings sample. In the most disaggregated regression specification, the explanatory power equals 15.75%, which is only marginally different from the positive earnings sample. According to the F-test for restrictions on coefficients, there is a significant increase in the adjusted R^2 from M1 to M2 and from M2 to M3 when earnings are negative (not tabulated). The explanatory power increases by 16.27 percentage points, compared to only 1.44 percentage points in the positive earnings sample.

Table 2 includes p-values from the Cramer-test (1987). The Cramer-test is used to test the statistical significance of differences in adjusted R^2 between two samples (compare to, e.g., Harris, Lang, and Muller, 1994). This test shows that the difference in value relevance between the positive and the negative earnings sample is highly significant, as measured by M1. However, as earnings are more and more disaggregated, the significance level decreases. The difference in explanatory power decreases to such an extent that there is no longer a statistical difference in value relevance between the two samples. In the classical study by Hayn (1995), the adjusted R^2 was 9.3% and 0 in the positive and negative earnings sample, respectively, as measured by M1. These numbers are very close the ones reported in Table 2, and lead Hayn (1995) to conclude that negative earnings are not at all value relevant. However, the findings of Table 2 instructively illustrate that this conclusion is sensitive to the earnings aggregation level. The results suggest that even negative earnings can provide useful information with respect to future cash flows and, hence, company value. However, one has to dig deeper to reveal the persistent earnings components. The findings in the IFRS sample are in accordance with the proposed hypothesis.

[Insert Table 3 about here]

The analysis is repeated on the NGAAP sample. Interestingly, the adjusted R^2 in the positive and negative earnings samples from specification M1 are identical to the values reported in Hayn (1995), 9.38% and 0.03%, respectively. There is a significant increase in the explanatory power of the positive earnings sample when M2 is applied. However, as M3 and M4 are introduced, there is no significant increase in the adjusted R^2. In the negative earnings sample, the explanatory power is consistently increasing as M2, M3 and M4 are applied. Maximum adjusted R^2 is reached in both samples when M4 is run. The explanatory power is then 13.62% and 6.50% in the positive and negative earnings samples, respectively. Although the increase in explanatory power is more pronounced in the negative than in the positive earnings sample, the difference between the two samples is also statistically significant, according to the Cramer test, when M4 is run. However, untabulated results demonstrate that the significant difference disappears if accruals are further disaggregated. If working capital is split into receivables, inventory and payables, and depreciation and impairment is split into its two underlying components, the explanatory power of the negative earnings sample increases to 10.45%. I do not focus on these most disaggregated regressions ("M5"), as they suffer from severe multicollinearity. Although multicollinearity does not bias the adjusted R^2, it makes the individual regression coefficients close to impossible to interpret.[vi]

I apply the explanatory power – the proportion of the variance in stock returns explained by the earnings variables – as the value relevance metric of this study in order to make the results comparable to previous research on the same topic. However, all regression details from the analyses of Tables 2 and 3 are presented in the Appendix. The regression details show that

even if aggregate earnings are not significantly related to stock returns when earnings are negative, several earnings items show up as significant when the negative earnings are disaggregated. This finding supports the claim that individual earnings items may be persistent even if bottom-line earnings are negative.

Several alternative tests are employed in order to test the robustness of the conclusion. I start out by investigating a number of control variables' possible influences on value relevance. In general, there may be other systematic differences between the two samples than only the sign of earnings. A possible difference can be related to company size; compare the descriptive statistics presented in Table 1. Prior research has suggested that value relevance may be an increasing function of company size (Easton and Zmijewski, 1989). It may be that my findings can be attributed to differences in company size rather than differences in the sign of earnings. Similar arguments can be presented for possible differences in intangible asset intensity – another variable shown to affect the value relevance of accounting information (see, e.g., Aboody and Lev, 1998; Lev and Sougiannis, 1996). In addition to company size and firm-specific intangible asset intensity, the control variables include book-to-market ratio (Collins and Kothari, 1989), interest rate (Easton and Zmijewski, 1989; Collins and Kothari, 1989), and market volatility (Dontoh, Radhakrishnan, and Ronen, 2004).[vii] All of my four sub-samples have been split equally according to the size of the control variables. M1 to M4 have been run on each of the samples. The tests do not alter any of the previously stated conclusions. The most influential control variable is company size. The results on size are reported in Table 4.

[Insert Tables 4 about here]

Panel A reports the results for the IFRS sample. When companies are small and earnings are positive, all value-relevant information appears to be embedded in aggregate earnings. In fact, for these observations, the explanatory power is highest when M1 is run. When earnings are negative, there is a substantial increase in explanatory power when moving from M1 to M4. However, the most dramatic increase is from M3 to M4. It appears that, for small companies, it is very useful to use disaggregated earnings data when firms report losses. Nevertheless, for the value relevance research to capture the usefulness of the earnings data, earnings need to be highly disaggregated. When companies are large, a different pattern emerges. For this group of firms, one needs a rather disaggregated model to capture the "full" value relevance of earnings even when earnings are positive. When earnings are negative, the value relevance metric increases substantially when the change in earnings is included in the regression. The NGAAP reports comparable, although not completely identical, findings (see Panel B). Note, for instance, that in the large company sample, the relative increase in value relevance from disaggregating earnings is also considerable when earnings are positive. This finding can be attributed to an exceptionally low adjusted R^2 in M1. In general, the relative usefulness of disaggregating positive earnings appears to be somewhat related to company size. It seems as though investors value small companies with positive earnings based on aggregate earnings, whereas they dig deeper into the income statement when the companies are larger. On the other hand, when earnings are negative, it appears that investors need more disaggregated information to value small rather than large companies. For large companies with negative earnings, there is a substantial increase in explanatory power from just including the change in earnings in the regression. The change in earnings is sometimes applied as a proxy for unexpected earnings in value relevance research (Beisland, 2009). Perhaps, it is sufficient to isolate the unexpected components of aggregate earnings to extract a large proportion of the value-relevant information from the income statement for this group of firms? To summarise,

the overall conclusions of this study are not affected by Table 4. On the contrary, Table 4 provides further support for the hypothesis that it is more useful to disaggregate earnings when bottom-line earnings are negative than when they are positive.

As the samples employed in this study are quite small, the second set of robustness checks examines the possible influence of individual or small groups of observations on the reported results. First, I have applied bootstrapping to further test the significance of the difference in explanatory power. 10,000 simulations are run for all the four sub-samples reported in Tables 2 and 3. Second, I have re-run all regressions using robust regression techniques. Even though the upper and lower percentiles of the main variables were deleted before the study was conducted, a small number of observations may still be influential on the results. Robust regression first performs an initial screening based on Cook's distance > 1 to eliminate gross outliers, before calculating starting values, and then performs Huber iterations, followed by bi-weight iterations (StataCorp, 2005). These two alternative tests of the properties of the two samples strongly confirm the previously stated conclusions.

The third set of robustness checks analyse the statistical specification and the econometric methods applied in this study. As all tests show similar results to those reported, I have chosen to stick to the standard OLS regressions and apply traditional value relevance specifications. This secures comparability to prior research. However, I will briefly summarise the results from some alternative tests:

- To capture possible year-specific effects, indicator variables for each year are included in M1 to M4. This increases the significance level for all years but confirms the

reported result that it is far more useful to disaggregate negative than positive earnings.

- Panel data techniques, assuming both fixed and random effects, have been applied. No conclusion is altered.
- In Tables 2 to 4, adjusted R^2 of different sub-samples are compared. This methodology has been criticised by, for instance, Brown, Kin and Lys (1999) and Gu (2007). Specifically, Brown et al. (1999) and Gu (2007) show that scale differences and/or sampling variations might lead to adjusted R^2 differences even if the underlying economic relation is identical in two samples. The final robustness check uses scale-adjusted RMSE as the measure of explanatory power, a methodology recommended by Gu (2007). Scale-adjusted RMSE gives exactly the same results as the ones reported, and I therefore present adjusted R^2s throughout the paper, as they can be related to past studies and have a more intuitive interpretation. [viii]

5 Conclusion

Prior research on the value relevance of accounting earnings has found that positive earnings are far more value-relevant than negative earnings. This study suggests that the lower value relevance of negative earnings stems primarily from earnings aggregation. Consistent with prior research, I find that aggregate losses are hardly value-relevant at all. However, when the losses are disaggregated into underlying components the value relevance increases to such an extent that there is no longer a significant difference in explanatory power between the positive and the negative earnings sample. Thus, contrary to conclusions drawn in prior value relevance studies, negative earnings companies also provide income data relevant for the valuation of the company. Stock investors are able to extract value-relevant information from the earnings statement even if aggregate earnings are negative. The findings may be related to

prior studies on earnings persistence. A large body of research has concluded that value relevance is closely related to persistence. My study proposes that even if negative earnings are not persistent on an aggregate level, it may be the case that individual earnings components are persistent. Thus, losses also may provide information with respect to the future cash flow-generating capabilities of the firm, but one has to dig deeper and analyse the various components of bottom-line earnings. From the stock investors' perspective, the usefulness of financial reporting may increase if the accounting regulations secured a clearer distinction between recurring and non-recurring items in the income statement.

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Appendix

The Appendix presents regression details from the empirical analyses of Tables 2 and 3.

[Insert Table 5 about here]

Table 1: Descriptive Statistics

Panel A: IFRS Sample

Distributional Characteristics

	Total sample (n = 545)			Positive Earnings (n = 355)			Negative Earnings (n = 190)		
Variable	**Mean**	**Median**	**St. dev**	**Mean**	**Median**	**St. dev**	**Mean**	**Median**	**St. dev**
EARN	-0.002	0.029	0.274	0.113	0.068	0.166	-0.217	-0.098	0.305
∆EARN	0.015	-0.001	0.304	0.063	0.016	0.236	-0.073	-0.062	0.386
CF	0.069	0.061	0.309	0.177	0.108	0.251	-0.132	-0.079	0.308
∆CF	0.032	0.008	0.371	0.083	0.024	0.312	-0.065	-0.037	0.446
ACC	-0.071	-0.034	0.203	-0.064	-0.033	0.182	-0.086	-0.041	0.237
∆ACC	-0.016	-0.005	0.264	-0.021	-0.006	0.242	-0.008	-0.005	0.300
∆WC	0.005	0.003	0.175	0.012	0.005	0.140	-0.007	-0.003	0.177
∆∆WC	-0.009	-0.002	0.272	-0.010	-0.002	0.265	-0.008	-0.002	0.285
DEP	0.076	0.041	0.104	0.068	0.040	0.085	0.091	0.047	0.131
∆DEP	0.012	0.004	0.043	0.012	0.005	0.030	0.013	0.004	0.061
∆DT	0.001	0.000	0.058	0.008	0.001	0.053	-0.011	0.000	0.065
∆∆DT	-0.005	0.000	0.102	-0.001	0.000	0.092	-0.012	0.000	0.118
RET	0.100	0.016	0.737	0.236	0.132	0.704	-0.154	-0.352	0.730
MV EQUITY	10 264	1 318	42 694	14 482	2 166	52 271	2 380	569	5 751

Pearson Correlation Matrix

	EARN	**∆EARN**	**CF**	**∆CF**	**ACC**	**∆ACC**	**∆WC**	**∆∆WC**	**DEP**	**∆DEP**	**∆DT**	**∆∆DT**	**RET**
EARN	**1.00**	**0.19**	**0.70**	**0.13**	**0.37**	0.05	**0.24**	0.00	**-0.40**	**-0.16**	0.11	-0.02	0.01
∆EARN	**0.62**	**1.00**	0.12	**0.75**	0.08	**0.17**	0.12	**0.29**	0.02	-0.03	-0.02	**0.28**	**0.31**
CF	**0.69**	**0.44**	**1.00**	**0.44**	**-0.40**	**-0.50**	**-0.38**	**-0.44**	0.07	0.12	**0.30**	**0.15**	0.04
∆CF	**0.35**	**0.64**	**0.65**	**1.00**	**-0.40**	**-0.52**	**-0.38**	**-0.35**	**0.15**	0.13	**0.15**	**0.42**	**0.16**
ACC	-0.04	-0.04	**-0.75**	**-0.58**	**1.00**	**0.71**	**0.80**	**0.58**	**-0.60**	**-0.36**	**-0.25**	**-0.22**	-0.04
∆ACC	**0.15**	**0.15**	**-0.41**	**-0.66**	**0.71**	**1.00**	**0.71**	**0.89**	**-0.20**	**-0.24**	**-0.24**	**-0.27**	**0.16**
∆WC	**0.18**	**0.17**	**-0.47**	**-0.44**	**0.82**	**0.74**	**1.00**	**0.71**	-0.09	0.01	-0.02	-0.10	-0.03
∆∆WC	**0.17**	**0.18**	**-0.37**	**-0.59**	**0.66**	**0.94**	**0.81**	**1.00**	-0.08	0.02	0.01	**0.15**	**0.15**
DEP	**0.37**	**0.30**	**0.58**	**0.27**	**-0.47**	-0.06	0.06	0.05	**1.00**	**0.59**	-0.07	0.00	0.11
∆DEP	**0.13**	0.09	**0.29**	**0.12**	**-0.27**	-0.07	0.04	0.02	**0.58**	**1.00**	**0.16**	0.12	-0.10
∆DT	**0.13**	**0.23**	0.09	0.10	-0.02	0.09	**0.38**	**0.32**	**0.20**	**0.12**	**1.00**	**0.55**	-0.14
∆∆DT	0.05	**0.11**	-0.06	0.02	**0.13**	0.08	**0.38**	**0.41**	**0.11**	-0.08	**0.66**	**1.00**	0.01
RET	**0.35**	**0.26**	**0.32**	**0.21**	**-0.13**	-0.02	0.03	0.03	**0.22**	0.07	**0.16**	**0.11**	**1.00**

Panel B: NGAAP Sample

Distributional Characteristics

	Total sample (n = 1,372)			Positive Earnings (n = 945)			Negative Earnings (n = 427)		
Variable	**Mean**	**Median**	**St. dev**	**Mean**	**Median**	**St. dev**	**Mean**	**Median**	**St. dev**
EARN	0.012	0.023	0.216	0.087	0.055	0.111	-0.155	-0.065	0.287
∆EARN	0.029	0.004	0.240	0.052	0.010	0.186	-0.023	-0.027	0.323
CF	0.123	0.060	0.277	0.174	0.102	0.271	0.010	-0.003	0.255
∆CF	0.026	0.005	0.357	0.049	0.013	0.286	-0.025	-0.008	0.474
ACC	-0.111	-0.045	0.260	-0.087	-0.039	0.227	-0.165	-0.056	0.315
∆ACC	0.003	-0.002	0.325	0.003	-0.001	0.267	0.002	-0.007	0.426
∆WC	-0.007	0.000	0.197	0.007	0.002	0.180	-0.039	-0.006	0.228
∆∆WC	0.004	-0.001	0.313	0.007	0.000	0.259	-0.002	-0.006	0.409
DEP	0.105	0.052	0.180	0.092	0.053	0.128	0.136	0.049	0.258
∆DEP	-0.002	0.002	0.115	0.000	0.002	0.062	-0.006	0.001	0.184
∆DT	-0.001	0.000	0.052	0.002	0.000	0.041	-0.009	0.000	0.070
∆∆DT	0.003	0.000	0.065	0.003	0.000	0.058	0.002	0.000	0.078
RET	0.188	0.074	0.754	0.303	0.155	0.732	-0.066	-0.243	0.740
MV EQUITY	5 664	962	17 300	6 924	1 350	19 100	2 873	512	12 100

Pearson Correlation Matrix

	EARN	**∆EARN**	**CF**	**∆CF**	**ACC**	**∆ACC**	**∆WC**	**∆∆WC**	**DEP**	**∆DEP**	**∆DT**	**∆∆DT**	**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
∆EARN	**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
∆CF	**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**
∆ACC	-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
∆WC	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
∆∆WC	-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**
∆DEP	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
∆DT	**-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**
∆∆DT	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 2009. Panel A and Panel B display statistics for the IFRS sample (2005-2009) and the NGAAP sample (1992-2004), respectively. Mean, median, standard deviation, and number of observations are listed for the total samples, the positive earnings samples, and

the negative earnings samples. The correlation matrices list correlation coefficients for the positive (negative) earnings samples below (above) the diagonal. Coefficients in **bold** denote a statistical significance at a 5% level using a two-sided test.

Variable definitions:

EARN:	Net earnings before extraordinary items.
CF:	Cash flow from operations. Cash flow = Earnings – Accruals.
ACC:	Accruals = Change in working capital (ΔWC) – Change in deferred taxes (ΔDT) – Depreciation and impairment (DEP).
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.
MV EQUITY:	Market value of equity (Million Norwegian Kroner)

Table 2: Value Relevance of Positive and Negative Earnings – IFRS Sample

	M1: Aggregate Earnings	*M2: Easton and Harris*	*M3: Cash Flow and Accruals*	*M4: Cash Flow and Accruals Items*
Positive Earnings	11.92 %	11.99 %	12.76 %	13.36 %
Negative Earnings	-0.52 %	8.80 %	13.54 %	15.75 %
Cramer-test (p-value)	0.000	0.537	0.893	0.701

Table description

Table 2 describes the value relevance of earnings for a sample of Norwegian firms from 2005 to 2009. All financial reports are prepared according to IFRS. Value relevance is measured as the explanatory power, the adjusted R^2, from the following regressions:

M1: $RET_{i,t} = \beta_0 + \beta_1 EARN_{i,t} + \varepsilon_{i,t}$

M2 : $RET_{i,t} = \beta_0 + \beta_1 EARN_{i,t} + \beta_2 \Delta EARN_{i,t} + \varepsilon_{i,t}$

M3 : $RET_{i,t} = \beta_0 + \beta_1 CF_{i,t} + \beta_2 \Delta CF_{i,t} + \beta_3 ACC_{i,t} + \beta_4 \Delta ACC_{i,t} + \varepsilon_{i,t}$

M4 : $RET_{i,t} = \beta_0 + \beta_1 CF_{i,t} + \beta_2 \Delta CF_{i,t} + \beta_3 \Delta WC_{i,t} + \beta_4 \Delta\Delta WC_{i,t} + \beta_5 DEP_{i,t} + \beta_6 \Delta DEP_{i,t} + \beta_7 \Delta DT_{i\,i,t} + \beta_8 \Delta\Delta DT_{i,t} + \varepsilon_{i,t}$

All variables are defined in Table 1. The statistical difference in adjusted R^2 between the positive and negative earnings sample is analysed with the Cramer-test (1987). The table lists p-values from the Cramer-test.

Table 3: Value Relevance of Positive and Negative Earnings – NGAAP Sample

	M1: Aggregate Earnings	*M2: Easton and Harris*	*M3: Cash Flow and Accruals*	*M4: Cash Flow and Accruals Items*
Positive Earnings	9.38 %	12.96 %	12.95 %	13.62 %
Negative Earnings	0.03 %	0.64 %	2.24 %	6.50 %
Cramer-test (p-value)	0.000	0.000	0.000	0.033

Table description

Table 3 describes the value relevance of earnings for a sample of Norwegian firms from 1992 to 2004. All financial reports are prepared according to NGAAP. Value relevance is measured as the explanatory power, the adjusted R^2, from the regressions outlined in Table 2. The statistical difference in adjusted R^2 between the positive and negative earnings sample is analysed with the Cramer-test (1987). The table lists p-values from the Cramer-test.

Table 4: Value Relevance as a Function of Company Size and the Sign of Earnings

Panel A: IFRS Sample

	M1: Aggregate Earnings	*M2: Easton and Harris*	*M3: Cash Flow and Accruals*	*M4: Cash Flow and Accruals Items*
SMALL COMP.				
Positive Earnings	14.00 %	13.74 %	12.93 %	13.60 %
Negative Earnings	-0.28 %	3.17 %	5.17 %	22.81 %
LARGE COMP.				
Positive Earnings	9.91 %	9.66 %	13.84 %	13.33 %
Negative Earnings	-0.95 %	13.13 %	17.81 %	22.13 %

Panel B: NGAAP Sample

	M1: Aggregate Earnings	*M2: Easton and Harris*	*M3: Cash Flow and Accruals*	*M4: Cash Flow and Accruals Items*
SMALL COMP.				
Positive Earnings	18.54 %	22.25 %	22.33 %	25.05 %
Negative Earnings	-0.36 %	-0.02 %	5.48 %	16.99 %
LARGE COMP.				
Positive Earnings	4.04 %	9.69 %	10.81 %	10.66 %
Negative Earnings	2.77 %	7.49 %	7.58 %	6.70 %

Table description
Table 4 describes the value relevance of earnings for a sample of Norwegian firms from 1992 to 2009. Panel A and Panel B display statistics for the IFRS sample (2005-2009) and the NGAAP sample (1992-2004), respectively. Value relevance is measured as the explanatory power, the adjusted R^2, from the regressions outlined in Table 2. In both panels, the observations have been split equally according to company size. SMALL COMP. are the companies with total market value of equity below the median, and LARGE COMP. are the companies with total market value of equity above the median.

Table 5: Value Relevance of Positive and Negative Earnings – Regression Details

Panel A: Positive Earnings

	M1: Aggregate Earnings		*M2: Easton and Harris*		*M3: Cash Flow and Accruals*		*M4: Cash Flow and Accruals Items*	
	IFRS	**NGAAP**	**IFRS**	**NGAAP**	**IFRS**	**NGAAP**	**IFRS**	**NGAAP**
EARN	1.48***	2.03***	1.29***	1.26***				
∆EARN			0.22	0.89***				
CF					1.27***	1.21***	1.23***	1.37***
∆CF					0.20	0.96***	0.11	0.77***
ACC					0.81**	1.24***		
∆ACC					0.23	0.82***		
∆WC							0.93**	1.24***
∆∆WC							0.05	0.71***
DEP							-0.33	-1.51***
∆DEP							-1.22	-0.98***
∆DT							0.31	-3.15***
∆∆DT							0.15	0.08
Adj. R^2	11.92 %	9.38 %	11.99 %	12.96 %	12.76 %	12.95 %	13.36 %	13.62 %
n	355	945	355	945	355	945	355	945

Panel B: Negative Earnings

	M1: Aggregate Earnings		*M2: Easton and Harris*		*M3: Cash Flow and Accruals*		*M4: Cash Flow and Accruals Items*	
	IFRS	**NGAAP**	**IFRS**	**NGAAP**	**IFRS**	**NGAAP**	**IFRS**	**NGAAP**
EARN	0.03	-0.13	-0.12	-0.15				
∆EARN			0.60***	0.21*				
CF					0.18	0.26	0.29	0.35*
∆CF					0.50***	0.19*	0.43***	0.00
ACC					-0.89***	-0.24*		
∆ACC					1.36***	0.37***		
∆WC							-0.98**	0.42*
∆∆WC							1.31***	-0.10
DEP							1.26***	0.56***
∆DEP							-3.12***	-0.65***
∆DT							-0.94	-0.41
∆∆DT							-1.40	-0.79
Adj. R^2	-0.52 %	0.03 %	8.80 %	0.64 %	13.54 %	2.24 %	15.75 %	6.50 %
n	190	427	190	427	190	427	190	427

Table description

Table 5 lists regression coefficients, total explanatory power (adj. R^2), and number of observations (n) for the regression analyses presented in Tables 2 and 3. Results are reported for both the IFRS and the NGAAP sample. Panels A and B display results for the positive and negative earnings observations, respectively. One asterisk * denotes statistical significance at the 10% level, two asterisks ** denotes significance at the 5% level and three asterisks *** denotes significance at the 1% level, tested two-sided.

[i] The European Economic Area (EEA) is comprised of the EU, plus Norway, Iceland and Lichtenstein.

[ii] Extraordinary items are disregarded so that these items do not affect the sample split. Otherwise possible increases in value relevance from earnings disaggregation could have been attributed to extraordinary items being isolated in a separate earnings item. Several prior studies have illustrated the low value relevance of extraordinary earnings (e.g., Ramakrishnan and Thomas, 1998). Regression analyses show that extraordinary items are value irrelevant in my samples also.

[iii] Prices from the last actual transactions are employed in the NGAAP sample. Hence, market data for the most illiquid stocks might be measured a few days prior to 30 December.

[iv] When measuring the degree to which an accounting system is accruals-based (as opposed to cash flow based) Norwegian GAAP scores approximately equal to the scores of Australia, Canada, the UK, and the USA (Brown, He, and Teitel, 2006).

[v] The term "significant" is applied when the significance level as measured by the p-value is below 0.05.

[vi] The results of Tables 2 and 3 are identical if raw returns are replaced by excess returns (Dechow, 1994). Excess return is estimated as the individual stock returns minus the market-wide return on Oslo Stock Exchange.

[vii] Collins and Kothari (1989) state that value relevance is a function of growth prospects. I use the book-to-market ratio as my (inverse) proxy for expected future growth. However, this ratio may also be considered as a control variable for accounting conservatism. Basu (1997) presents evidence that such conservatism reduces the value relevance of accounting numbers. Interest rate and market volatility are also applied as control variables. Collins and Kothari (1989) find a negative relationship between interest rates and value relevance, while Easton and Zmijewski (1989) propose that value relevance is negatively related to the expected rate of return (which over time is highly correlated with the level of interest rates). Dontoh, Radhakrishnan, and Ronen (2004) suggest that value relevance is an inverse function of non-information based trading activity, and I apply market volatility as a proxy for this kind of trading.

[viii] The criticism from Brown et al. (1999) and Gu (2007) is only valid when explanatory power is compared *across* samples, as in the Cramer-tests. However, when the change in explanatory power from disaggregating earnings *within* a sample is analysed, the criticism is no longer relevant.