The value relevance of financial reporting on the Oslo Stock Exchange over the period 1964–2003

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ABSTRACT

This article focuses on the value relevance of financial statements in Norway over the 40-year period from 1964 to 2003. Since Norwegian generally accepted accounting principles are based on an earnings-oriented conceptual view rather than a balance-oriented conceptual framework, like the ones adopted by the IASB and the FASB, this study provides interesting empirical evidence on the value relevance of earnings-oriented conceptual frameworks. Our main finding is that the value relevance of financial reporting for investors trading on the Oslo Stock Exchange has increased significantly over the past four decades. This result is obtained by evaluating the adjusted R^2-metric from a stock market return regression over time using deflated earnings and deflated change in earnings as explanatory variables, and controlling for changes in underlying economic variables over the period. A significant time trend is consistent with the view that Norwegian accounting regulators and standard setters have been successful in achieving more value relevant financial statements over time. Norway is an example where employing an earnings-oriented conceptual framework has improved the value relevance of accounting information.

1. INTRODUCTION

This article contributes to an increased understanding of the value relevance of financial reporting, i.e. the usefulness of financial information to investors. According to Beaver (2002), value relevance research examines the association between a security price dependent variable and a set of independent accounting variables. An accounting number is termed value relevant if it is significantly related to the dependent variable; price, return or abnormal return. We run regression-based value relevance tests utilizing Norwegian data over the 40-year period from 1964 to 2003.

The motivation for the article is along two dimensions. First, the Norwegian case may provide interesting knowledge about the value relevance of accounting information during a long period characterized by substantial changes in accounting rules and practice. From 1964 to 2003, Norway has moved from a tax-based creditor-oriented accounting legislation to a market-based investor-oriented accounting legislation. Increased focus on the informational need of investors in the accounting legislation and standard setting should increase the value relevance of accounting information over time, as better informed investors are able to determine value more precisely through stock trading. Second, and more importantly, the conceptual framework of Norwegian accounting rules has been on revenues and expenses (the income statement) rather than on assets and liabilities (the balance sheet). In contrast, balance-oriented conceptual frameworks have been emphasized by both the FASB and the IASB, and have therefore strongly influenced US and international standard setting. Since the Norwegian accounting law is based on an implicit earnings-oriented conceptual framework over the 40-year period we are examining, Norway is an interesting test arena for analyzing the value relevance of an earnings-oriented conceptual framework in general and the relative importance of earnings versus book values in specific. We run regressions to examine the development in value relevance over time, both over the whole period and related to specific accounting changes, i.e. major changes in accounting regulation and practice occurring periodically. We also examine the development of earnings response coefficients over time in addition to testing for intertemporal changes in the explained variability of our price and return regressions, measured by the more commonly used adjusted R^2-metric.

One of the characteristics in the global economy, including the Norwegian, is the shift from physical assets to intangible assets. It is a well known claim that the shift from an

industrialized, production-oriented economy to a high-tech, service-oriented economy has rendered traditional financial statements less relevant for assessing shareholder value, cf. Lev and Zarowin (1999). Furthermore, the effects of increased frequency of negative earnings, changes in firm size and other factors documented by the international value relevance literature may also have influenced value relevance over time. Accordingly, we also perform value relevance tests where we simultaneously control for changes in underlying factors; represented by the sign of earnings, market return, market volatility and industry characteristics, especially related to the intangible intensity of the economy.

The rest of the article is organized as follows. In Section 2, we give a brief summary of important contributions to the value relevance literature. In Section 3 and 4, we explain the development of the Norwegian accounting system and include some basic information about the Norwegian stock market – the Oslo Stock Exchange – and our data set. These sections contain the foundation of our empirical analyses. In Section 5, we explain our methodological approach and then present our data analyses and empirical findings. Finally, in Section 6, we offer some concluding remarks.

2. A BRIEF REVIEW OF THE VALUE RELEVANCE LITERATURE

In the past two decades, we have observed an increasing interest in connecting accounting variables to a stock market variable in order to investigate significant relationships between them, i.e. whether accounting variables are value relevant for investors or not. It is in itself important to find out whether such relationships exist and to measure how much of the variation in the dependent stock market variable (price, return or abnormal return) can be explained by accounting variables, usually on the pooled cross-section of companies. Furthermore, examining changes over time, i.e. to demonstrate an increase or a decrease in the value relevance of accounting figures, as well as to study the value relevance of various accounting items, such as intangible assets and nonrecurring items, are focused issues in the value relevance literature, cf. Beaver (2002).

A feature of value relevance studies is to use price or return data to identify value drivers that influence prices or returns over a longer period of time than what typically is the case in short window event studies, originating from Ball and Brown (1968). The approaches to value

firms by accounting variables have changed over time; cf. the approach of using permanent earnings adopted by Miller and Modigliani (1966) and the approach of using abnormal earnings adopted by Ohlson (1995) and Feltham and Ohlson (1995). The latter uses a linear function of equity book value and the present value of expected future residual income; cf. Penman (1998). Another interesting approach is the abnormal earnings growth model of Ohlson and Juettner-Nauroth (2005), see also Penman (2003, Ch. 6). These models can be seen as a theoretical framework for the empirical studies explaining stock market value by key accounting numbers.

Holthausen and Watts (2001) split value relevance studies into three categories. The first one contains relative association studies and focuses on the relationship between stock market values or returns and various accounting numbers. Values of R^2 from standard regression techniques are utilized to perform tests among alternative specifications based on the view that the larger the adjusted R^2, the greater the value relevance of the independent variables. Incremental association studies belong to the second category, where regression models are utilized to examine if an accounting variable, for instance earnings, is useful in explaining value or return over a long time period, usually given several other variables. Value relevance is then achieved when a regression coefficient, for instance the earnings response coefficient, is significantly different from zero. The third category comprises marginal information content studies. These types of studies are concerned with the relationship between return or abnormal return and investors' available information set. Event studies based on abnormal returns over a short period are employed to decide whether an accounting number surprise influences value or not. If an abnormal price or volume reaction is observed, the value relevance of the accounting surprise is established over the short event window, cf. Ball and Brown (1968) and Beaver (1968).

The major concern of Holthausen and Watts (2001) is the usefulness of the value relevance literature for standard-setting purposes. Although numerous studies have been carried out, Holthausen & Watts (2001) claim that the importance of this literature for standard setters is limited since the focus on equity valuation is so dominant and goes at the expense of other stakeholders. Since value relevance research is motivated from the assumption that financial statements are an important input for investors' perception of value, the empirical tests are naturally concerned with investor values. This is inconsistent with the view of accounting standard setters about the purpose of accounting, where all stakeholders are emphasized, even

though investors are among primary stakeholders. Holthausen and Watts (2001) also point out that a number of significant econometric issues have to be dealt with. However, the view of Holthausen and Watts (2001) is controversial. In fact, Barth, Beaver and Landsman (2001) claim the opposite, that value relevance research is important for both equity investors and standard setters. Although the primary focus is on relevance for investors, they conclude that other uses of financial statement information do not reduce the importance of this research for standard setters. And, in their opinion, a number of value relevance studies do address econometric issues in a proper way, cf. Brown, Lo and Lys (1999) and Aboody, Hughes & Liu (2002). Beaver (2002) points out that value relevance is one of the five areas in which accounting-based capital market research has made its greatest contribution, and thereby supports the view of Barth, Beaver and Landsman (2001).

As far as more recent US evidence regard, we find some important broad empirical value relevance studies. The purpose of Collins, Maydew and Weiss (1997) is to examine changes in value relevance over time. They are concerned with the validity of the assumption that a decline in value relevance has taken place as a consequence of the shift from an industrialized, production-oriented to a high-tech, service oriented economy. Using US data from the 40-year period 1953–1993, they are unable to confirm this hypothesis. On the contrary, a small increase in value relevance is observed. While the incremental value relevance of earnings has declined over the period, it has been replaced by an increasing value relevance of book values. Much of this shift can be explained by the increasing frequency and magnitude of one-time items, the increasing frequency of negative earnings and the change in the average size of stock listed firms as well as the intensity of intangible assets over time. Lev and Zarowin (1999) find a systematic decline in value relevance over time, using US data from 1964–1996. Their result is driven by the increasing degree and impact of business changes, which are inadequately reflected in the current financial reporting system. Their analyses are founded on a classification of firms according to the level of change in firms' operations and economic conditions and the use of R&D. Francis and Schipper (1999), utilizing US data from 1952–1994, arrive at different conclusions, depending on which accounting variable has been employed. Consistent with Collins, Maydew and Weiss (1977), they find that the explanatory power of earnings has significantly decreased over time. On the other hand, the ability of the book value of assets and liabilities, and thereby equity, to explain market-based equity values has increased. In summary, US data supports that earnings have decreased, while balance sheet items has increased in value relevance.

The value relevance literature also addresses the questions of how various accounting numbers are priced by the stock market. For example, Barth (1994) demonstrates that the ease with which bank management is able to estimate fair values, has an impact on pricing multiples. Financial assets will typically have an accounting value close to their market value and thus be highly value relevant. There is evidence, e.g. Barth, Beaver and Landsman (1992), that unrecorded pension assets and liabilities are priced consistent with the capital market's view of these items as liabilities. Intangible assets, R&D and advertising expenditures, unbooked environmental liabilities and (other) footnote information are other examples of items found to be value relevant in these types of studies, see e.g. Lev and Sougiannis (1996), Aboody and Lev (1998), Chambers, Jennings and Thompson (1999), Joos (2000) and Hughes (2000).

The above studies are performed on US data only. Harris, Lang and Möller (1994) compare the value relevance for US and German firms over the period 1982–1991. While the explanatory power of shareholder's equity was significantly lower in Germany than in the US, the explanatory power of earnings was not significantly different. Furthermore, the explanatory power of accounting data was found to be increasing over time. The coefficients linking earnings or equity to stock prices or returns were generally higher in Germany than in the US, although the explanatory power of the regressions were lower. Joos and Lang (1994) analyse the effect of differences in accounting in France, Germany and the UK. They find significant differences in the stock market valuation of accounting variables among the countries. Joos (1997) investigates differences in value relevance in Germany, France and the UK. He finds that the value relevance of accounting numbers is higher in France than in the UK and Germany. Furthermore, earnings are more value relevant than book values in the UK, while the value relevance of earnings versus book values is not statistically different in neither Germany or in France. King and Langli (1998) look for differences in value relevance among Germany, Norway and the UK, based on data from 1982–1996. Accounting numbers in the UK have the highest correlation with stock prices, while they have the lowest correlation in Germany. Book values are more important in Germany and Norway than in the UK. The diversity in international accounting practice is put forward as the major explanation of these findings. Arce and Mora (2002) consider the value relevance of financial statements based on listed firms in eight European countries; Belgium, France, Germany, Italy, The Netherlands, Switzerland, Spain and the UK. They conclude that earnings seem to be more relevant than book value in investor-oriented countries, and vice versa in creditor-oriented countries. In that

case, evidence from US value relevance studies suggests that US is the exception. Moreover, accounting information in terms of earnings and book value is not more value relevant in investor-oriented countries than in creditor-oriented countries.

To perform our tests, regression models based on the theoretical foundation of Ohlson (1995) and Feltham and Ohlson (1995) are employed; cf. Easton and Harris (1991) for empirical specifications of the regressions. We start out with stock price as the dependent variable, and earnings and book values per share as the independent variables, since this approach has been utilized in several value relevance studies in the literature. However, it raises methodological issues, especially those stemming from scale effects. Several authors therefore run regressions using first differences or rather return or abnormal return regressions. Brown, Lo and Lys (1999) point out that cross-sample comparison of adjusted R^2 can only be made if differences in the coefficient of variation across samples are controlled for, and they provide procedures for an appropriate scale-adjustment in value relevance analyses. By replicating the studies of Collins, Maydew and Weiss (1997) and Francis and Schipper (1999), they found a decline in value relevance when scale effects are dealt with, which is consistent with the findings of Lev and Zarowin (1999). Hence, our analysis and discussion are primarily based on the results from return regressions, after presenting some preliminary results obtained from price regressions. Aboody, Hughes and Liu (2002) find that the time trends in Collins, Maydew and Weiss (1997), Francis and Schipper (1999) and Lev and Zarowin (1999) do not change after controlling for possibly inefficient markets.

3. IMPORTANT ASPECTS ABOUT THE NORWEGIAN ACCOUNTING SYSTEM

The Norwegian accounting system has undergone substantial changes during the last decades. Up to the Company Act of 1976 and the Accounting Act of 1977, financial statements were based on tax rules. The Accounting Act of 1977 introduced a tax linked model, and was an attempt to present financial statements that satisfied the information requirements of investors as well as the tax authorities, cf. Johnsen (1993) and Eilifsen (1996). The model made a link at the end of the income statement where the difference between accounting income and taxable income was reported. In the balance sheet, these differences are known as untaxed reserves or untaxed equity. The change in untaxed reserves was accordingly reported as an adjustment to accounting income immediately preceding the bottom line in the income

statement. This format was gradually adopted for various timing differences. In particular, following a major change in tax rules for depreciation in 1984, timing differences in the depreciation of fixed assets were also addressed by this format. For several years, tax considerations continued to play an important role in measuring accounting income. For example, most large firms did not disclose information about tax-induced reserves in foot notes until 1984–1985; cf. King and Langli (1998).

In 1990, an Accounting Act Committee was appointed by the Ministry of Finance to draft proposals to revise existing accounting legislation, cf. Johnsen and Eilifsen (2003). In 1992, the Committee submitted a report on accounting for income taxes. As a consequence of the Tax Reform of 1992, the Norwegian accounting legislation was changed to introduce deferred tax liabilities and assets, beginning in 1992. Hoogendoorn (1996) concludes that Norway then belongs to the group of European countries with the highest degree of independence between accounting and taxation. Hope (1999) is concerned about the effects of introducing deferred tax accounting in Norway. He uses data from 1980–1996 and finds that the value relevance of net income increased after the introduction of deferred taxes in 1992. This effect is strongest for small and medium sized firms, which can be explained by large firms typically disclosing more and better information on taxes prior to 1992 than small and medium sized firms.

In 1995, the Committee presented its main report, and a new Accounting Act was effective from 1999. As noted by Johnsen and Eilifsen (2003), this act represents continued adherence to a legal framework of regulation. The general requirement of the EU directives that annual accounts shall give a true and fair view is implemented by a general requirement that annual accounts shall be prepared in accordance with good accounting practice. It is assumed that this practice, Norwegian GAAP, will be further developed by the Norwegian Accounting Standards Board, mainly in line with IASB standards, but of course within the earnings orientation prescribed by the Accounting Act.

Norwegian accounting rules are based on an earnings-oriented conceptual view, cf. Kvifte (2004). This orientation toward principles for determining revenues and expenses is manifested in the Norwegian Accounting Act of 1998. The matching principle is stated as one of its basic accounting principles. This is in contrast to the balance-sheet oriented framework of the IASB and the FASB, where definitions of assets and liabilities have priority. An example of how the choice between an earnings- and a balance sheet-oriented conceptual

framework could affect accounting numbers in practice is accounting for periodic maintenance expenditures. According to the matching principle, future periodic maintenance expenditures could be accounted for as a provision, which could be built up over the period until the next periodic maintenance. The yearly provision is an expense taken in the income statement. But according to a balance-sheet oriented framework, a maintenance provision is not a liability, because it is claimed not to be an obligation and could therefore not be recorded in the balance sheet as debt. Instead, the maintained assets are considered to have two components, where the maintained component capitalized in the balance sheet is depreciated over the period until the next periodic maintenance. The core component is depreciated over its economic life. The capitalized maintenance expenditures are thus expensed through depreciations instead of yearly provisions. In Norway, accounting for periodic maintenance expenditures by provisions is allowed, but not according to IFRS/IAS and US GAAP. Even though there are differences between the two conceptual frameworks in practice, they are identical in principle, implying that Norwegian generally accepted accounting principles in most cases would be identical or very similar to international accounting principles.

As an overall impression, there is little doubt that Norwegian accounting legislation during the last decades has changed from a Continental-European creditor- and tax oriented model of accounting legislation to a model closer to an Anglo-American investor-oriented model. However, the Norwegian focus on revenue recognition and matching differs from the IASB and the FASB asset and liability view. This makes Norwegian empirical evidence on value relevance especially interesting in contrast to former evidence from particularly the US. We hypothesize that earnings are relatively more value relevant in our sample of Norwegian firms than previously found on US data due to the focus in Norway on earnings. Changes in Norwegian accounting rules have been made continuously in accordance with changes in international financial accounting regulations, while the tax linked model of 1977 and the deferred tax model of 1992 may be seen as examples of major accounting events. As regards accounting regulation and practice, we hypothesize that the value relevance of financial statements reported to the Norwegian capital market increases over time. We therefore test the time trend of the value relevance metrics, controlling for changes in a set of underlying economic variables. We also test for changes in value relevance related to four major accounting events in the period 1964–2003; the Accounting Act of 1977, the disclosure of untaxed equity in 1984, the Tax Reform of 1992, and the Accounting Act of 1998. We

hypothesize that the value relevance is higher in the five-year period after each of these major accounting events relative to the five-year pre-period, cf. Hope (1999).

4. DATA

In an international perspective, the Oslo Stock Exchange (OSE) is a small stock market with relatively high trading activity. At the end of our test period, i.e. in 2003, the total market value of the listed firms' equity was NOK 689.7 billions. The total number of firms listed at the end of 2003 was 178. The turnover value was NOK 552.5 billions. The turnover velocity, measured as the average of annualized turnover per month divided by market value at the end of each month, was 97.7 in 2003. We find that Norwegian stock prices have become slightly more volatile over time. This will in itself typically reduce the proportion of variance explained over time when running regressions between stock market prices and accounting variables, cf. Francis & Schipper (1999). In our empirical analyses we will therefore control for changes in market volatility over time.

One of the recent characteristics in the global economy is the shift from physical assets to intangibles. For example, the number of OSE listed firms in the Information Technology and Telecommunication sectors has increased rapidly during the last decade. The market value of these firms was 0.7 % of the total OSE market value at the end of 1993, while the corresponding value was 16.0 % at the end of 2003. It reached its highest proportion of 21.5 % at the end of 2000. The claim that the shift from an industrialized economy to a high-tech, service-oriented economy has rendered traditional financial statements less relevant for assessing shareholder value is well known, cf. e.g. Lev and Zarowin (1999) and Lev (2001). The effects of increased frequency of negative earnings, changes in firm size and other factors documented by the value relevance literature may also negatively influence value relevance. These effects will be discussed in Section 5.4. Consequently, we also perform relevance tests where we simultaneously control for changes in underlying economic factors.

Annual stock market prices, earnings and book values from 1964–2003 are collected from various sources. Stock market prices for 1968–2003 are obtained from the Stock Market Data Base at the Norwegian School of Economics and Business Administration (NHH) as well as from the OSE. Other stock prices, earnings, book values and the number of outstanding shares

are collected from the publication Kiærulff's Handbook of Corporate Information as well as directly from annual reports published by the firms.

The stock price is the price on the OSE at the year end. Earnings per share are defined as the reported net income (excluding dirty surplus, but including other transitory items) divided by the number of outstanding shares. Book value per share is the equity value reported in the financial statement, including 72 % (since the company tax rate is 28 %) of untaxed reserves prior to 1992, divided by the number of outstanding shares.

To control for the effects of extreme values, we remove observations that are in the top or in the bottom one percent of the time series of stock prices, earnings per share and book values per share, respectively. The final sample then comprises 4,708 firm-year observations for each of the time series, which is a substantial number of observations in a Norwegian financial accounting study. During the period of analysis, several firms are introduced and others are delisted on the OSE. The final sample covers 518 individual firms, spanning from 1 to 40 years of observations. Next, these time series are utilized to calculate yearly price/earnings and price/book ratios for each company. When performing these calculations, we eliminate negative earnings and book values, which results in 3,492 price/earnings and 4,708 price/book firm-year observations, cf. Table 2 for regressions based multiples. Table 1 presents descriptive statistics for the final sample.

[Table 1 about here]

We learn from Table 1 that the empirical distribution of the three variables prices, earnings and book values per share are typically skewed with fat right-hand tails, making the median a better indicator of the centre of the distribution than the mean. All variables are characterized by large standard deviations. Furthermore, we observe that the median of the price/book ratio and the median of the price/earnings ratio for the period are 1.17 and 14.21, respectively. The latter figure is relatively close to that of Shiller (2005), who calculates the average price/earnings ratio in the US to be about 16 for the period 1881–2005. Finally, the value-weighted (i.e. each company is weighted by its relative market value) profitability is 15.2 % and the value-weighted stock market return is 14.7 %. The latter variable represents capital gains and excludes dividends. Table 1 also includes the variables $earnings_t/price_{t-1}$ and changes in $earning_t/price_{t-1}$, since these two variables are included in our return regressions.

5. METHODOLOGY AND EMPIRICAL RESULTS

We start this section by examining the relationship between stock prices and book values and earnings by carrying out traditional stock price regressions as in e.g. Collins, Maydew and Weiss (1997). Since price level regressions are apt to be negatively influenced by scale or level effects, we follow Easton and Harris (1991) and also perform stock return regressions. In running both types of regressions, the focus is on how value relevance has developed over time. Thereafter, we focus on the effect of specific changes in the Norwegian accounting system by comparing regression results from each of four pre- and post-event periods related to substantial changes in Norwegian accounting regulation. Obviously, a number of external economic and fundamental factors will influence on value relevance over time, so we extend our analysis by controlling for such factors.

5.1 Value relevance measured by price regressions over the period 1964–2003

We apply the following cross-sectional regression to estimate the relationship between prices and two explanatory variables, book values and earnings per share:

$$P_{it} = a_0 + a_1 B_{it} + a_2 E_{it} + \varepsilon_{it}\,, \tag{1}$$

where P_{it} is the price of a share in firm i at fiscal year end t, B_{it} is the adjusted book value per share of firm i at the year end t, E_{it} is the earnings per share of firm i during the year t, and ε_{it} is other value-relevant information of firm i for year t, independent of earnings and book values per share. The book value per share has been adjusted by subtracting the earnings per share. This is to avoid possible multicollinearity problems, since the year end book value contains the same period's earnings.

Next, following the technique of decomposing total explanatory power, cf. Theil (1971), we estimate the explanatory power of book values and earnings per share, respectively, by the regressions:

$$P_{it} = b_0 + b_1 B_{it} + \varepsilon_{it} \tag{2}$$

$$P_{it} = c_0 + c_1 E_{it} + \varepsilon_{it}\,. \tag{3}$$

We denote the coefficient of explained variation from these three models $\overline{R}^2_{BE}$, $\overline{R}^2_B$ and $\overline{R}^2_E$, respectively. We use $\overline{R}^2_{BE}$ as a metric to measure value relevance along with $\Delta\overline{R}^2_B = \overline{R}^2_{BE} - \overline{R}^2_E$, i.e. the incremental explanatory power provided by book values, and $\Delta\overline{R}^2_E = \overline{R}^2_{BE} - \overline{R}^2_B$, i.e. the incremental explanatory power provided by earnings.

As pointed out, the empirical findings on the development in value relevance over time are not unambiguous. Several studies indicate that the value relevance of earnings has declined while the value relevance of book values has increased, i.e. they have moved inversely to each other, cf. Section 2. To examine whether the value relevance of earnings and book values, as well as of the incremental value of earnings and book values, has changed over time in our sample, we run three time trend regressions. These regressions express the explanatory power, $\overline{R}^2_{BE}$, $\Delta\overline{R}^2_B$ and $\Delta\overline{R}^2_E$, respectively, as a function of a time trend variable *t*:

$$\overline{R}^2_t = d_0 + d_1 \cdot t + \varepsilon_t, \tag{4}$$

where t=1,...,40 covers the period 1964–2003. The explanatory power has increased (decreased) over time if d_1 is significantly positive (negative) at the 5 per cent confidence level.

Panel A of Table 2 presents the cross-sectional results of regressing price on both book value and earnings per share, as well as on each of them. We observe that all coefficient estimates have the expected sign and are highly significant. Furthermore, the value relevance score measured by the adjusted $\overline{R}^2$ is 61.5 % in the multiple regression model, while book values and earnings per share in the simple regression models account for 58.9 % and 40.2 %, respectively. The average value of $\Delta\overline{R}^2_B$ and $\Delta\overline{R}^2_E$ show a substantial incremental explanatory power only for book values per share, 21.3% as opposed to 2.6%, respectively. These findings are much in line with other value relevance studies, see e.g. Collins, Maydew and Weiss (1997). Norway, with its implicit earnings-oriented conceptual framework, seems to be broadly in line with US findings

[Table 2 about here]

Panel B of Table 2 summarizes annual cross-sectional regression results. We observe that the coefficient estimates for book value is significant in all years except 1993, while the coefficient estimate for earnings is significant in 27 years. Furthermore, all adjusted $\overline{R}^2$-values are quite volatile. There is no distinct pattern in $\overline{R}^2$-values over time, which is confirmed by the results for each of the three variables in Panel C of Table 2. All time trend coefficient estimates are not significantly different from zero. The corresponding explanatory power is always low. Hence, our preliminary conclusion is that there is no significant change in value relevance over the period 1964–2003 in Norway. This is in contrast to price regression findings on US data, cf. Section 2.

5.2 Value relevance measured by return regressions over the period 1964–2003

Brown, Lo and Lys (1999) show that the R^2-metric in value relevance tests is biased upwards in the presence of scale effects. A related issue is the fact that the presence of a scale factor is likely to cause the error term in the regressions to be heteroskedastic, cf. Easton and Sommers (2000) and Barth and Clinch (1999). Brown, Lo and Lys (1999) conclude that making cross-sectional or temporal comparisons of R^2 is not valid, unless these effects are controlled for. Following Easton and Harris (1991) and others, one way of dealing with potential scale effect problems is to use first-order differences of the variables in Equation (1)–(3), i.e. $\Delta P_{it} = P_{it} - P_{it-1}$, $\Delta B_{it} = B_{it} - B_{it-1}$ and $\Delta E_{it} = E_{it} - E_{it-1}$, and divide them by P_{it-1}:

$$\Delta P_{it} / P_{it-1} = a_0 + a_1 \Delta B_{it} / P_{it-1} + a_2 \Delta E_{it} / P_{it-1} + e_{it} \quad (5)$$

$$\Delta P_{it} / P_{it-1} = b_0 + b_1 \Delta B_{it} / P_{it-1} + e_{it} \quad (6)$$

$$\Delta P_{it} / P_{it-1} = c_0 + c_1 \Delta E_{it} / P_{it-1} + e_{it} \quad (7)$$

In this approach, stock return replaces stock price as the dependent variable. When stock returns include dividend yield, the change in book value in year *t* is equivalent to the earnings in year *t*. The two independent variables of Equation (5) will then represent the earnings per share, E_{it}, and the change in earnings per share, ΔE_{it}, both relative to the price at the beginning of the year, P_{it-1}. Thus we replace ΔB_{it} by E_{it} in Equations (5) and (6) and denote the associated equations (5') and (6'), respectively. The explanatory power of Equation (5'),

measured by $\overline{R}^2_{E\Delta E}$, is typically much lower than that of Equation (1).

Panel A of Table 3 presents cross-sectional regression results of stock return on both deflated earnings per share and deflated change in per share earnings, as well as on each of them. Again, all coefficient estimates have the expected sign and are significant. The value relevance score measured by the associated adjusted coefficient of determination of the multiple regression model, $\overline{R}^2_{E\Delta E}$, is 5.4 %, while the deflated earnings and the deflated change in earnings in the simple regression models both account for 3.6 %. The average value of both $\Delta\overline{R}^2_E$ and $\Delta\overline{R}^2_{\Delta E}$ is equal to 1.8 %. These figures are much in line with previous findings on American and Norwegian data; see e.g. Easton and Harris (1991) and Hope (1999); the latter operates with $\overline{R}^2_{E\Delta E}$ equal to 8 % over the period from 1981 to 1996. Again, Norway does not seem to differ much.

[Table 3 about here]

Panel B of Table 3 summarizes annual cross-sectional regression results. Now, the coefficient estimates for deflated earnings per share are significant for exactly half of the years, while the coefficient estimates for the deflated change in earnings per share are significant for only three years. In addition, Panel B also includes annual earnings-response coefficients, i.e. the sum of the absolute value of deflated earnings per share and the absolute value of deflated change in earnings per share coefficients for each year. Again, all R^2-values are quite volatile. Moreover, we find no clear pattern in either $\overline{R}^2$-values or the ERCs, i.e. $|a_1| + |a_2|$, over time. This is supported by the results for each of the variables in Panel C of Table 3, as all time trend coefficient estimates are not significantly different from zero.

Accounting data, represented by book values, earnings and change in earnings have been found to be highly value relevant. However, our preliminary conclusion remains, i.e. no significant increase or decrease in value relevance in Norway over the period 1964–2003. This is in contrast to similar findings on US data, cf. Section 2.

5.3 The immediate effects of changes in the Norwegian accounting system on value relevance

Although no significant trend in value relevance has been revealed, a more immediate impact could result from one or several of the changes in the Norwegian accounting system during our 40-year period 1964–2003. The effect on value relevance of The Accounting Act of 1977, of the change from hidden to open tax reserves in 1984, the Tax Reform of 1992 and the Accounting Act of 1999, is therefore analysed by performing two cross-sectional regressions in accordance with Equation (5'), using data five years before and five years after each event.

It turns out that only the events happing in 1984 and in 1992 have positive effects, in the sense that the value relevance measure increases from 5.6 % to 6.1 % and from 4.9 % to 6.4 %, respectively, from the pre-event to the post-event period. The latter finding is consistent with Hope (1999), who found an increase in $\overline{R}^2_{E\Delta E}$ from 7.4 % to 8.2 %. A Chow-test demonstrates that the regression equations changed significantly, the associated *p*-value is 0.000 in both cases. The "accounting revolutions" in terms of major accounting changes are value relevant.

More surprising is the significant decline associated with the new Accounting Act of 1998, in fact the $\overline{R}^2$-value dropped from 11.1 % to 5.7 %. However, we suspect that this is due to the bubble-like pricing of many companies, especially in the first two years of the post-event period, i.e. in 1999 and 2000, for companies related to information technology and communications. This illustrates the necessity of controlling for factors that are likely to have an impact on value relevance, to be able to conclude whether or not there is an underlying time trend in the associated metric.

5.4 Controlling for the impact of underlying factors on value relevance

A number of studies are concerned with investigating explanatory factors that may bring forward important information about fundamental forces driving the value relevance of accounting information. For example, Lev and Zarowin (1999) identify the increasing rate and impact of business change, especially the growth of intangible assets in the economy and the inadequate accounting treatment of this change, as major reasons for a decline in value relevance. Francis and Schipper (1999) repeat some of their analyses on two samples of firms,

belonging to low- and high-technology industries, respectively, to test whether the current reporting model differentiates value relevance between traditional and new tech firms. Collins, Pincus and Xie (1999) argue that the shift in value relevance may be a result of the increasing frequency and magnitude of one-time items, the increasing frequency of negative earnings and changes in average firm size of stock listed firms and intangible intensity across time. Our study includes five controlling factors that will enter as additional independent variables in Equation (4).

First, Collins, Pincus and Xie (1999) claim that the increased frequency of negative earnings observed over time could contribute to a temporal decline in the incremental value relevance of earnings. Based on Hayn (1995) and Basu (1997), as well as on the evidence in Burgstahler and Dichev (1997), we may conclude that value relevance shifts from earnings to book values when earnings are negative or as firms face financial distress. When the going concern assumption is questioned, a firm's abandonment or liquidation value becomes more relevant for measuring shareholder value. The incremental explanatory power of book values will then increase relative to earnings, since book values are more closely related to abandonment values, cf. Berger, Ofek and Swary (1996) and Burgstahler and Dichev (1997). To control for the possible effect of negative earnings on the value relevance of accounting information, the proportion of companies with negative earnings in year t enters our time regression equation as the variable $LOSS_t$.

Second, value relevance may vary with market return. According to the abnormal earnings growth model, the market price can be expressed as the present value of the current level of earnings and the present value of (abnormal) growth opportunities, cf. e.g. Penman (2003, Ch. 6). The latter component is reflected in stock market prices, but not in current financial statements, unless current abnormal earnings growth is to some degree permanent. In bull (bear) markets, we would expect an increasing (decreasing) divergence between market prices and reported financial accounting numbers as future growth opportunities become more important. Therefore, value relevance would be high (low) in those fiscal years when the stock market return is low (high). To capture this effect, the annual market return on the Oslo Stock Exchange in year t, RET_t, is included in our time regression model.

Third, failing to control for changes in the volatility of market return over time could affect the value relevance of accounting information. Following e.g. Francis and Schipper (1999), if

the value relevance of financial statement information is constant through time, while the volatility of market return is increasing (decreasing) for reasons that cannot be traced to accounting information, a lesser (larger) proportion of the variability of the dependent price or return variable will be explained by the independent accounting information variables. In that case, the explained variation tests will be biased toward the result that value relevance is decreasing (increasing) over time as volatility increases (decreases) over time. Thus, we hypothesize that value relevance is high (low) in years of low (high) market volatility. Therefore, the variable VOL_t, the annualized standard deviation based on monthly market return observations on the Oslo Stock Exchange in year t, becomes the third controlling factor in our time regression analysis.

Fourth, following Francis and Schipper (1999) and others, we believe that the value relevance of accounting information varies among industrial sectors due to differences in the underlying real economic activity, i.e. intangible-intensive high-technology and service firms render less value relevant accounting numbers than other firms. The prevailing historical cost financial reporting model is not well suited to report intangible resources related to R&D, human capital, brand names, etc. Certain intangible assets such as research are not reported in the balance sheet, and certain investment expenditures such as research are expensed, even though capitalization would be preferred from an economic point of view, cf. Høegh-Krohn and Knivsflå (1999). As noted earlier, the importance of OSE listed firms in the Information Technology and Telecommunication sectors has increased rapidly during the last decade, which in itself could imply a decline in value relevance over time due to an increasing magnitude of intangibles in the economy. In order to control for this effect, the proportion of companies belonging to the IT&T sector in year t, INT_t, is the fourth controlling factor in the expanded version of Equation (4).

Fifth, Hayn (1995) demonstrates that smaller companies are more likely to report losses than larger companies. Thus, lower persistence of losses leads to an increased importance of book values relative to earnings in valuation. To check whether size influences on value relevance, the log of the median market value in year t, $SIZE_t$, is our fifth and final controlling factor. All market values are calculated in 2003 prices when comparing size.

If independent variables in a multiple regression model are strongly correlated, the problem of multicollinearity occurs, i.e. coefficient estimates are unstable and imprecisely estimated, t-

values are typically low and $\overline{R}^2$-values relatively high. There are several approaches to decide whether a given model is satisfactory in this respect. We use the Condition Index and follow the advice of Belsley, Kuh and Welsh (1980) that the value of this index should not exceed 20, cf. also Greene (1997, p. 422). Using all five factors argued for above, the Condition Index turned out to be about 34, i.e. above the recommended acceptable value. $SIZE_t$ was the major problem in our model because of a high correlation with $LOSS_t$, and the size variable was therefore excluded as this gives highest explanation. The Condition Index then achieved a value of about 9.5. Consequently, our analysis has been based on the following regression model:

$$\overline{R}^2_{E\Delta E,t} = d_0 + d_1 \cdot t + d_2 \cdot LOSS_t + d_3 \cdot RET_t + d_4 \cdot VOL_t + d_5 \cdot INT_t + \varepsilon_t' \qquad (8)$$

The results are found in Panel A of Table 4. Although no coefficient estimate of any of the control variables included in the extended model is significantly different from zero, their presence still has a substantial impact on $\overline{R}^2_{E\Delta E,t}$, the trend coefficient estimate has become significantly larger than zero (the associated *p*-value is 0.042). However, a significant time trend can not be revealed from regressions based on neither $\Delta\overline{R}^2_E$ or $\Delta\overline{R}^2_{\Delta E}$ alone as dependent variables, suggesting that it is the joint contribution of earnings and change in earnings that drives the result of a significant time trend.

[Table 4 about here]

To further examine the conclusion of a positive time trend in the joint value relevance of earnings and earnings change, we focus on the ERCs. The earnings-oriented approach in Norway indicates that ERCs should also exhibit a similar time trend pattern, perhaps stronger. To check upon this, results from a corresponding regression model, where ERC_t substitutes $\overline{R}^2_{E\Delta E}$ in Equation (8), is presented in Panel B of Table 4.

Two important findings occur. The positive time trend coefficient estimate is now highly significant (its *p*-value is 0.001), which is consistent with our hypothesis regarding the effect of improved accounting relevance over time. Furthermore, the variable $LOSS_t$ is also highly significant (its *p*-value is 0.002). The estimate is negative, which is in line with the view of Collins, Pincus and Xie (1999), i.e. an increased frequency of negative earnings is associated

with a decline in the value relevance of earnings. The significant positive time trend in ERC is also revealed when examining the absolute value of the two underlying earnings response coefficients, $|a_1|$ and $|a_2|$, separately. The control variable $LOSS_t$ is only significant in the former regression.

6. CONCLUDING REMARKS

This article has focused on the value relevance of financial statements in Norway over the 40-year period 1964–2003. Our purpose has been to test whether changes in generally accepted accounting principles in Norway are followed by a change in value relevance of accounting information over time, controlling for other factors expected to influence value relevance. Our study is also motivated by the fact that Norwegian accounting legislation and practice have been based on an earnings-oriented framework rather than on a balance-oriented framework, like the conceptual frameworks chosen by the FASB and the IASB. Hence, our study provides interesting empirical evidence on the value relevance of earnings-oriented conceptual frameworks – a topic which is of importance for capital market-based financial accounting research in general, and for standard setting in particular.

In the empirical part of the article, we run both price regressions and return regressions. We also control the value relevance metrics obtained from our return regressions for changes in underlying variables which, by the international literature, are documented to influence value relevance. Our main finding is that the value relevance of financial reporting for investors trading on the Oslo Stock Exchange has increased over our 40-year period of analysis when we simultaneously control for changes in underlying economic and fundamental variables, represented by negative earnings, market return, market volatility and intangible asset intensity. This result is consistent with the view that Norwegian accounting regulators and standard setters have been successful in achieving more value relevant financial statements for investors in the stock market. Hence, our case is an example where accounting based on an earnings-oriented conceptual framework has produced increased value relevance – and a case where earnings-response coefficients have increased over time.

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Table 1: Descriptive statistics 1964–2003

Variable	No. obs.	Mean (eq.-w.)	Mean (value-w.)	Stand. dev.	Lower quart.	Median	Upper quart.
Price (P_t)	4,708	303.2	175.7	711.8	36.0	101.00	210.00
Book value (B_t)	4,708	311.6	97.2	824.3	23.3	87.7	198.0
Earnings (E_t)	4,708	20.3	10.7	72.0	0.0	4.1	15.2
Price/Book (P_t/B_t)	4,708	2.01	3.48	4.52	0.73	1.17	1.96
Price/Earnings (P_t/E_t)	3,492	91.12	34.35	997.11	8.45	14.21	26.63
Profitability (E_t/B_{t-1})	4,708	0.059	0.152	0.592	-0.001	0.058	0.133
Stock return (P_t/P_{t-1})	4,243	0.056	0.147	0.574	-0.267	0.000	0.250
$Earnings_t/Price_{t-1}$	4,243	0.026	0.069	0.233	0.000	0.049	0.105
$\Delta Earnings_t/Price_{t-1}$	4,243	0.018	0.010	0.300	-0.051	0.000	0.052

Price (P_t) is the stock price on the OSE at the year end. Book value per share (B_t) is the equity value reported in the financial statement (which prior to 1992 include 72 % of untaxed reserves) divided by the number of outstanding shares. Earnings per share (E_t) is the reported net income (excluding dirty surplus, but including other transitory items) divided by the number of outstanding shares. Based on these variables, we calculate the ratios price/book (P_t/B_t), price/earnings (P_t/E_t), profitability (E_t/B_{t-1}) and stock return (P_t/P_{t-1}), as well as the scale-adjusted variables $earnings_t/price_{t-1}$ and $\Delta earnings_t/price_{t-1}$, where $\Delta earnings_t = (earnings_t - earnings_{t-1})$. Mean (eq.-w.) is calculated as an equally-weighted mean, while Mean (value-w.) is calculated as a value-weighted mean relative to the companies' market values on OSE.

Table 2: Cross-sectional regressions of price (P) on book values (B) and earnings (E) 1964–2003

Panel A: Pooled Value Relevance 1964–2003

Regressions: $P_{it} = a_0 + a_1 B_{it} + a_2 E_{it} + \varepsilon_{it}$ (1)

$P_{it} = b_0 + b_1 B_{it} + \varepsilon_{it}$ (2)

$P_{it} = c_0 + c_1 E_{it} + \varepsilon_{it}$ (3)

(p-values in parentheses) i = 1–4708 firm-year observations

a_0	a_1	a_2	$\overline{R}^2$	$\Delta\overline{R}_B^2$	$\Delta\overline{R}_E^2$
92.373** (0.000)	0.537** (0.000)	2.142** (0.000)	0.615	0.213	0.026
b_0	b_1				
96.679** (0.000)	0.663** (0.000)		0.589		
c_0		c_1			
176.160** (0.000)		6.266** (0.000)	0.402		

** Significant at the 1% level

Price (P_t), Book value (B_t) and Earnings (E_t) are defined in Table 1, with the exception that in the regressions above, E_t has been subtracted from B_t in order to avoid possible multicollinearity problems due to the fact that year end equity contains the income of the year. The coefficient of determination from model (1)–(3) is denoted $\overline{R}_{BE}^2$, $\overline{R}_B^2$ and $\overline{R}_E^2$, respectively. $\Delta\overline{R}_B^2 = \overline{R}_{BE}^2 - \overline{R}_E^2$ is the incremental explanatory power provided by book value, and $\Delta\overline{R}_E^2 = \overline{R}_{BE}^2 - \overline{R}_B^2$ is the incremental explanatory power provided by earnings.

Panel B: Value relevance over time

Year	No. obs.	Book value	p-value	Earnings	p-value	Total $\overline{R}^2_{BE}$	Incr. B $\Delta\overline{R}^2_B$	Incr. E $\Delta\overline{R}^2_E$
1964	49	0.803	0.000	-1.164	0.548	0.572	0.222	-0.006
1965	50	0.541	0.000	1.174	0.362	0.595	0.234	-0.001
1966	51	0.436	0.000	1.554	0.201	0.671	0.158	0.005
1967	60	0.502	0.000	0.520	0.502	0.739	0.306	-0.002
1968	66	0.685	0.000	-0.261	0.850	0.356	0.211	-0.010
1969	72	0.765	0.000	0.938	0.414	0.385	0.201	-0.003
1970	68	0.624	0.000	5.923	0.000	0.746	0.145	0.140
1971	93	0.667	0.000	4.591	0.000	0.809	0.199	0.060
1972	95	0.508	0.000	3.897	0.000	0.806	0.197	0.083
1973	92	0.665	0.000	3.919	0.000	0.638	0.132	0.067
1974	98	0.800	0.000	2.186	0.000	0.806	0.303	0.025
1975	100	0.239	0.000	3.695	0.000	0.640	0.069	0.085
1976	103	0.608	0.000	0.555	0.376	0.700	0.553	-0.001
1977	96	0.357	0.000	1.993	0.000	0.838	0.168	0.038
1978	94	0.436	0.000	0.791	0.009	0.792	0.452	0.014
1979	96	0.413	0.000	2.072	0.000	0.677	0.254	0.049
1980	94	0.280	0.000	2.740	0.000	0.516	0.197	0.087
1981	96	0.304	0.000	2.123	0.019	0.359	0.098	0.032
1982	102	0.401	0.000	0.164	0.860	0.362	0.149	-0.006
1983	108	0.606	0.000	3.239	0.030	0.493	0.204	0.018
1984	119	0.653	0.000	0.849	0.402	0.371	0.203	-0.002
1985	119	0.888	0.000	3.653	0.000	0.362	0.214	0.091
1986	128	0.791	0.000	1.952	0.000	0.748	0.376	0.025
1987	126	0.898	0.000	1.855	0.050	0.749	0.738	0.006
1988	118	0.445	0.000	0.457	0.068	0.701	0.231	0.006
1989	97	1.388	0.000	2.135	0.073	0.302	0.249	0.017
1990	101	1.046	0.000	2.670	0.000	0.368	0.306	0.154
1991	95	0.465	0.000	1.136	0.000	0.240	0.187	0.113
1992	102	0.222	0.002	0.700	0.002	0.216	0.076	0.073
1993	132	0.051	0.699	5.355	0.000	0.522	-0.003	0.260
1994	145	1.315	0.000	-4.643	0.000	0.428	0.315	0.083
1995	162	0.877	0.000	0.609	0.113	0.600	0.380	0.004
1996	171	0.712	0.000	2.107	0.000	0.594	0.150	0.044
1997	215	0.771	0.000	4.141	0.000	0.776	0.150	0.110
1998	229	0.866	0.000	0.697	0.003	0.786	0.481	0.008
1999	212	0.843	0.000	0.969	0.108	0.339	0.175	0.005
2000	205	0.792	0.000	0.872	0.004	0.711	0.385	0.011
2001	203	0.712	0.000	1.074	0.000	0.769	0.519	0.041
2002	183	0.686	0.000	1.454	0.000	0.862	0.391	0.023
2003	163	0.582	0.000	3.051	0.000	0.889	0.237	0.119

Panel C: Time trend from price regressions 1964–2003

Regression: $\overline{R}_t^2 = d_0 + d_1 \cdot t + \varepsilon_t$ t=1–40 years (4)
(p-values in parentheses)

Dependent variable	d_0	d_1	$\overline{R}^2$
$\overline{R}^2_{BE,t}$	0.609** (0.000)	0.000 (0.858)	-0.025
$\Delta\overline{R}^2_{B,t}$	0.183** (0.003)	0.003 (0.175)	0.023
$\Delta\overline{R}^2_{E,t}$	0.016 (0.471)	0.001 (0.139)	0.032

** Significant at the 1% level

Table 3: Cross-sectional regressions of stock return ($\Delta P_{it} / P_{it-1}$) on relative earnings (E_{it} / P_{it-1}) and relative change in earnings ($\Delta E_{it} / P_{it-1}$) 1964–2003

Panel A: Pooled Value Relevance 1964–2003

Regressions: $\Delta P_{it} / P_{it-1} = a_0 + a_1 E_{it} / P_{it-1} + a_2 \Delta E_{it} / P_{it-1} + e_{it}$ (5')

$\Delta P_{it} / P_{it-1} = b_0 + b_1 E_{it} / P_{it-1} + e_{it}$ (6')

$\Delta P_{it} / P_{it-1} = c_0 + + c_1 \Delta E_{it} / P_{it-1} + e_{it}$ (7)

(*p*-values in parentheses) i = 1–4243 firm-year observations

a_0	a_1	a_2	$\overline{R}^2$	$\Delta\overline{R}^2_E$	$\Delta\overline{R}^2_{\Delta E}$
0.042** (0.000)	0.350** (0.000)	0.273** (0.000)	0.054	0.018	0.018
b_0	b_1				
0.044** (0.000)	0.470** (0.000)		0.036		
c_0		c_1			
0.055** (0.000)		0.365** (0.000)	0.036		

** Significant at the 1% level

Panel B: Value relevance over time

Year	No. obs.	Earnings	p-value	Change in Earnings	p-value	ERC	Total $\overline{R}^2_{E\Delta E}$	Incr. E $\Delta\overline{R}^2_{E}$	Incr. ΔE $\Delta\overline{R}^2_{\Delta E}$
1964	48	0.447	0.314	-0.218	0.558	0.665	-0.021	0.001	-0.014
1965	48	0.331	0.216	-0.259	0.497	0.590	-0.008	0.013	-0.012
1966	53	0.870	0.007	-0.296	0.299	1.166	0.112	0.122	0.002
1967	58	0.840	0.001	0.083	0.563	0.923	0.158	0.167	-0.010
1968	62	0.188	0.589	0.124	0.728	0.312	-0.015	-0.012	-0.015
1969	72	0.033	0.860	0.067	0.575	0.100	-0.020	-0.014	-0.010
1970	76	0.333	0.416	0.251	0.463	0.584	0.008	-0.004	-0.006
1971	79	-0.253	0.395	0.429	0.053	0.682	0.029	-0.003	0.036
1972	92	-0.008	0.975	-0.111	0.680	0.119	-0.020	-0.011	-0.009
1973	93	1.202	0.002	-0.495	0.074	1.698	0.080	0.091	0.023
1974	98	0.781	0.001	-0.239	0.190	1.020	0.090	0.100	0.007
1975	103	0.617	0.000	0.045	0.753	0.662	0.215	0.126	-0.007
1976	100	0.252	0.099	0.011	0.949	0.263	0.036	0.017	-0.010
1977	98	0.275	0.016	0.029	0.780	0.305	0.091	0.048	-0.009
1978	95	0.123	0.172	-0.032	0.662	0.155	-0.001	0.010	-0.009
1979	88	-0.344	0.065	0.728	0.000	1.072	0.263	0.021	0.242
1980	94	0.610	0.006	0.185	0.448	0.795	0.113	0.068	-0.004
1981	91	1.305	0.007	-0.470	0.076	1.505	0.067	0.070	0.023
1982	94	0.660	0.055	0.090	0.717	0.750	0.050	0.029	-0.009
1983	93	-0.403	0.280	0.374	0.111	0.777	0.008	0.002	0.017
1984	101	0.186	0.551	0.250	0.407	0.435	0.002	-0.006	-0.003
1985	92	0.473	0.028	0.267	0.262	0.739	0.085	0.040	0.003
1986	109	0.701	0.001	-0.182	0.151	0.883	0.084	0.093	0.009
1987	114	0.387	0.043	0.066	0.604	0.454	0.035	0.027	-0.006
1988	105	0.473	0.061	0.080	0.654	0.553	0.027	0.025	-0.008
1989	89	0.550	0.120	-0.008	0.971	0.558	0.010	0.017	-0.011
1990	88	0.931	0.043	-0.641	0.073	1.572	0.026	0.037	0.026
1991	85	0.128	0.607	0.228	0.353	0.356	0.028	-0.009	-0.001
1992	78	0.481	0.010	0.196	0.351	0.677	0.150	0.066	-0.001
1993	90	-0.272	0.305	0.221	0.172	0.493	0.020	0.001	0.010
1994	123	1.035	0.000	-0.226	0.167	1.260	0.104	0.112	0.007
1995	133	-0.343	0.471	1.112	0.007	1.456	0.060	-0.003	0.046
1996	146	0.682	0.028	0.201	0.299	0.883	0.046	0.026	0.001
1997	159	1.734	0.000	0.129	0.721	1.863	0.229	0.089	-0.004
1998	203	0.762	0.000	-0.101	0.338	0.863	0.100	0.104	0.000
1999	197	0.279	0.114	-0.198	0.135	0.478	0.008	0.008	0.006
2000	180	0.841	0.000	-0.003	0.984	0.845	0.089	0.070	-0.005
2001	191	0.638	0.000	-0.005	0.950	0.643	0.115	0.110	-0.005
2002	181	0.593	0.000	0.046	0.548	0.639	0.172	0.154	-0.003
2003	144	0.035	0.885	0.810	0.000	0.845	0.174	-0.006	0.174

Panel C: Time trend from return regressions 1964–2003

Regression: $\overline{R}_t^2 = d_0 + d_1 \cdot t + \varepsilon_t$ t=1–40 years (4)
(*p*-values in parentheses)

Dependent variable	d_0	d_1	$\overline{R}^2$
$\overline{R}^2_{E\Delta B,t}$	0.033 (0.155)	0.002 (0.067)	0.061
$\Delta\overline{R}^2_{E,t}$	0.034* (0.048)	0.001 (0.443)	-0.010
$\Delta\overline{R}^2_{\Delta E,t}$	-0.002 (0.898)	0.001 (0.325)	0.000

* Significant at the 5% level

Table 4: Time trend regressions with control variables

Panel A: Time trend regression on $\overline{R}_t^2$

Regression: $\overline{R}_t^2 = d_0 + d_1 \cdot t + d_2 \cdot LOSS_t + d_3 \cdot RET_t + d_4 \cdot VOL_t + d_5 \cdot INT_t + \varepsilon_t'$ (8)

t = 1–40 years (*p*-values in parentheses)

Dependent variable	d_0	d_1	d_2	d_3	d_4	d_5	$\overline{R}^2$
$\overline{R}^2_{E\Delta E,t}$	0.056 (0.083)	0.003* (0.042)	-0.157 (0.292)	-0.042 (0.309)	-0.062 (0.736)	-0.081 (0.738)	0.015
$\Delta\overline{R}^2_{E,t}$	0.046* (0.026)	0.002 (0.140)	-0.170 (0.077)	-0.093** (0.001)	0.074 (0.527)	0.074 (0.633)	0.194
$\Delta\overline{R}^2_{\Delta E,t}$	-0.005 (0.806)	0.001 (0.269)	-0.049 (0.605)	0.062* (0.023)	-0.008 (0.947)	-0.061 (0.692)	0.099

* Significant at the 5% level, ** Significant at the 1% level

Panel B: Time trend regression on ERC

Regression: $ERC_t = d_0 + d_1 \cdot t + d_2 \cdot LOSS_t + d_3 \cdot RET_t + d_4 \cdot VOL_t + d_5 \cdot INT_t + \varepsilon_t'$ (8')

t = 1–40 years (*p*-values in parentheses)

Dependent variable	d_0	d_1	d_2	d_3	d_4	d_5	$\overline{R}^2$
$\lvert a_1\rvert + \lvert a_2\rvert$	0.762** (0.000)	0.031** (0.001)	-2.546** (0.002)	-0.186 (0.393)	0.522 (0.591)	-1.955 (0.136)	0.193
$\lvert a_1\rvert$	0.520** (0.001)	0.020* (0.015)	-1.695* (0,021)	-0.338 (0.089)	0.476 (0.584)	-0.907 (0.435)	0.083
$\lvert a_2\rvert$	0.242* (0.021)	0.011* (0.045)	-0.851 (0.077)	0.152 (0.247)	0.046 (0.936)	-1.048 (0.181)	0.093

* Significant at the 5% level, ** Significant at the 1% level

t is the time variable, $LOSS_t$ is the proportion of companies with negative earnings in year t, RET_t is annual market return in the Oslo Stock Exchange in year t, VOL_t is the annualized standard deviation based on monthly stock market returns on the Oslo Stock Exchange, INT_t is the proportion of companies belonging to the IT&T sector in year t.