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ABSTRACT

Firms listed on stock exchanges within the European Economic Area are required to report consolidated financial statements according to IFRS from 2005. The firms that adopted IFRS in 2005 were also required to restate their 2004 financial statements from national GAAP to provide comparable accounting figures. These two sets of financial statements for 2004 are thus based on identical underlying economic activities and are fully specified according to two different reporting regimes. Our sample consists of 145 restatements from NGAAP to IFRS for firms listed on the Oslo Stock Exchange in Norway. We test whether the IFRS accounting figures correlate more strongly with stock market values than the corresponding NGAAP figures. We find little evidence of increased value-relevance after adopting IFRS when comparing and evaluating the two regimes unconditionally. On the other hand, when evaluating the change in the accounting figures from NGAAP to IFRS, we find evidence that the reconcilement adjustments to IFRS are marginally value-relevant due to increased relevance of the balance sheet and the normalized net operating income. By weighting our sample by firm size, intangible asset intensity and profitability, we learn that the increased value-relevance of the net operating income stems from different reporting of intangible assets. Since more intangible assets are capitalized according to IFRS than NGAAP, our finding is consistent with the view that capitalizing intangible assets is more value-relevant than expensing them as incurred or through goodwill amortization.

Keywords: Value-relevance of reporting standards, IFRS versus NGAAP, accounting harmonization, balance sheet-oriented conceptual frameworks versus earnings-oriented conceptual frameworks.

1. Introduction

In 2002, the European Union decided that firms listed on stock exchanges within the European Economic Area have to report consolidated financial statements according to International Financial Reporting Standards, IFRS. This new reporting regime started in 2005. It is important for accounting producers, regulators, standard-setters and users to gain insight about how the largest accounting reform within the EU/EEA may improve the usefulness of accounting information from an investor perspective.[1] When estimating the value-relevance of adopting IFRS, proper benchmarks are required. These benchmarks should be constructed so that only financial reporting effects are captured. As part of the IFRS adoption, financial statements prepared according to local or national accounting standards for 2004 had to be restated to IFRS in the 2005 accounts (IFRS 1, paragraph 36). Thus there exist two comparable sets of financial statements, representing the same underlying economic activities, which enable us to evaluate IFRS relative to national standards and to capture only financial reporting effects.

From a policy perspective, IFRS should be compared with feasible alternatives. IFRS are clearly more value-relevant than national standards for countries with a weak tradition of disclosing information useful for investors, see Ball (2006) and Daske, Hail, Leuz and Verdi (2007). Conservatism in terms of biased accounting estimates typically found in these countries should thus not be included in any policy benchmark used to evaluate the value-relevance of IFRS. One relevant alternative is an advanced national accounting standard based on an earnings-oriented conceptual framework with focus on non-biased matching of costs with earned revenues. This would contrast the balance sheet-oriented conceptual framework of IFRS with focus on non-biased fair value accounting and no emphasis on the matching principle. Our choice of benchmark, Norwegian Generally Accepted Accounting Principles,

[1] The control or stewardship perspective is not evaluated in this paper. This, of course, does not mean that control relevance is less important when evaluating the relevance of IFRS.

satisfies this requirement. NGAAP are principle-based, earnings-oriented and require the use of unbiased accounting estimates. We believe that NGAAP are an interesting, and challenging, benchmark for IFRS and employ two-sided tests for overall value-relevance differences. A failure to reject the null hypothesis of equal value-relevance will contribute not only to question the superiority of a balance-oriented conceptual framework in general, cf. Dichev (2007), but also IFRS in particular, as the most relevant reporting regime for investors, cf. Ball (2006).

In addition, we believe it is valuable in itself to obtain knowledge about the consequences of implementing IFRS in a given country and compare results across nations. Two examples are Callao, Jarne and Lainez (2007) and Horton and Serafeim (2007), where national benchmarks are the Spanish GAAP and the UKGAAP, respectively. This type of studies may provide more in depth analyses of the accounting sources of value-relevance differences than studies involving a large sample of countries like Daske, Hail, Leuz and Verdi (2007) and Jermakowicz and Gornik-Tomaszewski (2006). The focus of the former lies mainly on the economic consequences of mandatory IFRS reporting, while the latter is concerned with the IFRS adoption process.

We have collected market and accounting data for all firms listed on the Oslo Stock Exchange, OSE, in 2004 and 2005. 145 of these firms reported financial statements in 2004 according to NGAAP, and restated them when adopting IFRS in 2005. The objective is to identify value-relevance differences between the 2004 IFRS and NGAAP financial statements and to extract important policy implications from our findings. We perform two types of tests to determine value-relevance differences and their significance between IFRS and the chosen benchmark NGAAP; two-sample unconditional comparison tests and marginal dependency tests, utilizing value-relevance measures derived from price, return and abnormal return regressions.

Our unconditional comparison tests reveal that NGAAP get a high score on the value-relevance measure, as compared to IFRS. In fact, when evaluated by price regressions, in which book value of equity and various decompositions of earnings per share are explanatory variables, the value-relevance of the NGAAP figures is significantly higher than that of the corresponding IFRS figures. Improved value-relevance of the balance sheet (equity) turns out to be offset by reduced value-relevance of the income statement (earnings). When evaluated by return or abnormal return regressions, using price-deflated earnings and/or change in earnings as explanatory variables, the scores on the value-relevance measures are also typically in favor of NGAAP earnings. These results are also valid when the sample is weighted according to firm size, intangible asset intensity and profitability. No improvement in value-relevance seriously challenges the benefits of adopting IFRS for countries such as Norway with an advanced accounting regulation prior to IFRS adoption. This result is consistent with the finding of Daske, Hail, Leuz and Verdi (2007) that the capital-market benefits of adopting IFRS are weaker when national GAAP are closer to IFRS, see also Callao, Jarne and Lainez (2007), Horton and Serafeim (2007) and Van der Meulen, Gaeremynck and Willekens (2007ab). Although NGAAP are based on an earnings-oriented conceptual framework with emphasize on matching cost with earned revenue, it turns out to be of minor importance when it comes to unconditional value-relevance differences in comparison with a balance sheet-oriented alternative.

The main result of our marginal dependency tests is that IFRS contain additional value-relevant information as compared to NGAAP: [2] Using price regressions, the adjustment of the book value of equity from NGAAP to IFRS is significant; suggesting that increased measurement at fair value improves value-relevance of the balance sheet (but not earnings). Using return and abnormal return regressions, the adjustment of the normalized net operating in-

[2] Marginal tests were introduced by Amir, Harris and Venuti (1993) in order to evaluate the value-relevance of reconciliation adjustment between USGAAP and non-USGAAP, see also Pope and Rees (1992), Barth and Clinch (1996) and Harris and Muller (1999).

come from NGAAP to IFRS is significant – although this is not true for overall earnings. Thus, information about net operating assets, revenue recognition and cost determination according to IFRS is on the margin valuable to investors. Transitory components in earnings due for example to revaluations, seem to harm the overall value relevance of earnings (but not of the balance sheet) and prove the necessity of reporting these items separately so that earnings may be normalized, see Bradshaw and Sloan (2002). This suggests that the adoption of IFRS in countries already having an advanced accounting regulation may still be important from a value-relevance perspective. To get further insight into what areas of reporting that drive this result, we control for potential extreme observations and industry effects as well as weight our sample according to known value-relevance drivers such as firm size, intangible asset intensity and profitability.

We find that intangible-intensive firms report a net operational income that on the margin is more value-relevant according to IFRS than NGAAP. Since more intangible assets are capitalized according to IFRS, our finding is consistent with the view that the capitalization of intangible expenditures as assets in the balance sheet is more value-relevant than expensing them as incurred, see Lev and Zarowin (1999), Aboody and Lev (1998) and Lev and Sougiannis (1996). For example, development expenditures are required to be capitalized according to IFRS if they are assets, while they more often are expensed as incurred according to NGAAP – although an option to capitalize is available. Internally generated goodwill is indirectly capitalized according to IFRS due to the non-amortization of purchased goodwill and other intangible assets with indefinite economic lives, while these assets are systematically amortized according to NGAAP. IFRS require intangible assets with indefinite lives to be tested annually for impairment.

In Norway and other countries with a developed accounting regulation prior to the adoption of IFRS, the advantage of implementing this reform has been questioned. Our em-

pirical findings support this view in the sense that the unconditional value-relevance of IFRS is not larger than that of NGAAP. On the other hand, our marginal dependency findings show that IFRS have marginal value-relevance relative to NGAAP. These benefits may outbalance implementation costs, especially when taking into account the positive effects of a harmonization leading to increased value-relevance in countries with a less developed accounting system, see Daske, Hail, Leuz, and Verdi (2007). This is an advantage for all investors investing in the international capital market.

This paper is organized as follows. In Section 2, we give a short overview of the differences between IFRS and NGAAP, concentrating on the main differences rather than technical details. These differences are the basis for formulating our test hypotheses and for developing an appropriate test methodology in Section 3. In Section 4, we present the data and give some descriptive statistics. The test results and discussion of their implications are found in Section 5, while Section 6 concludes.

2. Differences between IFRS and NGAAP

International Financial Reporting Standards, IFRS, are issued by the International Accounting Standards Board, IASB, in London. IASB aims at developing international accounting standards of high quality for the benefit of accounting harmonization worldwide. In 2002, the European Union decided that all firms listed on stock exchanges within the European Economic Area, EEA, i.e. the European Union and some smaller countries outside the EU, should report consolidated financial statements according to IFRS, beginning in 2005 (EU Regulation 1606/2002). These firms are now the main users of IFRS, along with firms from many countries allowing or requiring IFRS. Norwegian Generally Accepted Accounting Principles, NGAAP, are the national accounting regulation in Norway, a member of the EEA. The most

important regulations are the Accounting Act of 1998 and the national accounting standards, issued by the Norwegian Accounting Standards Board, NASB.

IFRS are based on a balance sheet-oriented conceptual framework, i.e. the approach starts with defining assets, debt and thereby equity as the residual. Comprehensive income in terms of reported earnings and 'dirty surplus' constitutes the change in equity not related to capital expansion or withdrawal, for example paid dividends. When the balance sheet is the starting point, as is the case in classical valuation theory, it comes natural to measure the balance sheet at fair values and to make the net income equal to the net change in fair values, at least when these values can be measured reliably. Cost accounting is accepted when there is no reliable alternative. Over time, IFRS have increasingly pointed at fair value as the principle of measurement.

NGAAP are based on an earnings-oriented conceptual framework in which the calculation of annual performance is the starting point for developing relevant accounting. A project, or a firm, creates values if its internal rate of equity return is greater than the cost of equity. This suggests that the aim of accounting should be to report an income and a book value of equity such that the return on equity becomes a reliable measure of the internal rate of equity return, see Hendriksen and van Breda (1992, pp. 315-317 and pp. 541-546). This return is calculated on the basis of transactional investment costs being matched with future economic benefits generated by those costs. Net income should therefore be the costs matched with earned revenues – and the balance sheet is in principle the transactional cost value. Nevertheless, when cost is lower than fair value, it is written down, suggesting a partial adjustment to fair value (conservatism). Impairment losses add noise to the calculation of the internal rate of equity return.

The major difference between IFRS and NGAAP, as these accounting regimes have developed over time, is that the preferred principle of measurement in reality has become fair

value according to IFRS and cost according to NGAAP. However, none of these reporting regimes are completely faithful to their ideal measurement principle. IFRS have the cost model as an alternative or a requirement when fair value is not easily and reliably measurable, while NGAAP have the fair value model as a requirement when market value is lower than cost and when fair value of financial instruments is reliably measurable in liquid markets. All in all, the discrepancy between IFRS and NGAAP is not large in practice – and could be summarized by IFRS allowing for more reporting at fair value.

To illustrate, we focus on the measurement of intangible and fixed assets. IFRS and NGAAP agree that initial recognition should be at cost, which usually equals fair value at the time of acquisition. Thereafter, the two reporting regimes may disagree on measurement. IFRS permit either the cost model or the revaluation model; although the latter is accepted only if fair values may be measured reliably. NGAAP, on the other hand, require the cost model. According to prudent historical cost, the carrying amount of an intangible or fixed asset is the cost less accumulated depreciation less accumulated impairment losses. The revaluation model implies that the carrying amount is fair value when a revaluation takes place. Between revaluations, the amount is reduced by depreciation and possible impairment. The times of revaluations should be so regular that the carrying amount does not differ materially from its fair value. Since most firms using IFRS will choose the cost model, due to difficulties of measuring fair value reliably, the carrying amount of fixed and intangible assets according to IFRS and NGAAP will be very close.[3]

Some of the most important differences between IFRS and NGAAP are: 1) NGAAP require goodwill to be amortized over the best estimate of the useful life and tested for impairment losses. IFRS require only that it, along with other intangible assets of indefinite lives, is

[3] Even when the revaluation model is chosen according to IFRS and the cost model according to NGAAP, the reported income may not differ much. The reason is that fair value write-downs are included in the cost model through prudence and that fair value write-ups are excluded from reported income in the revaluation model. Instead, they are reported directly as an adjustment to equity, i.e. as 'dirty surplus'. In this way, write-ups are included only in comprehensive income.

tested annually for impairment. 2) According to IFRS, research expenditures should be expensed when incurred, while NGAAP render the option of recognizing research expenditures as an intangible asset – an option seldom used by stock exchange listed firms. Development expenditures leading to future economic benefits should be recognized as an intangible asset according to IFRS, while NGAAP have the option to expense immediately – an option often used. 3) Periodic maintenance of an asset is accounted for as an investment according to IFRS, which is depreciated over time until the next periodic maintenance. NGAAP also allow it to be reported as a future obligation (provision). An annual maintenance provision is taken over the period until the next periodic maintenance expenditure. Generally, provisions are more rarely recognized as debt according to IFRS than NGAAP, since it could be questioned whether future expenditures, such as maintenance and some types of restructuring, really are present obligations according to the definition of debt. 4) According to IFRS, inventories being biological assets, like farmed fish, should be measured according to fair values when such values may be measured reliably. Other inventories should be measured at the lower of cost and market. The latter principle is the only alternative for inventories according to NGAAP. 5) Most financial instruments are measured at fair value and amortized cost according to IFRS. In accordance with NGAAP, financial assets and debt are measured at cost, unless they are short-term financial instruments traded in a liquid market. In that case, they are measured at fair value. 6) Investment properties are measured at fair value according to IFRS and cost according to NGAAP. In addition to these six areas, differences between IFRS and NGAAP typically appear in relation to pensions, deferred taxes and to some extent share-based payments.

The auditing firm Ernst & Young has registered descriptive data about the IFRS implementation of 110 companies listed on the OSE in 2005. 28% of the firms reported a reduction in the 2004 net income, while 72% reported an increase. On average, the increase in net in-

come was 17%. The largest effects on reported net income are caused by non-amortization of goodwill (40%) and capitalization of development expenditures (28%), suggesting that accounting for intangible assets causes the largest differences in reported income between IFRS and NGAAP.[4]

3. Hypotheses and Test Methodology

Our two test hypotheses, specified as alternatives to their nulls, follow from the review of IFRS and NGAAP in Section 2:

1) The value-relevance of IFRS financial statements is significantly different from that of NGAAP statements, as evaluated by the adjusted R^2 in market value regressions with appropriate accounting variables as explanatory variables.
2) The value-relevance of particular accounting items like book value and earnings are significantly different in IFRS financial statements relative to NGAAP statements, as evaluated by these items' associated regression coefficients and their marginal contribution to the adjusted R^2, and weighted by potential value-relevance drivers such as intangible asset intensity and profitability.

We are open for the finding that NGAAP might be more value-relevant than IFRS, although most observers would expect the introduction of IFRS to be an improvement. Thus, two-sided tests are employed.

The value-relevance of accounting information in general, and reporting standards like NGAAP and IFRS in particular, may be evaluated by employing price, return and abnormal return regressions, see Barth, Beaver and Landsman (2001) and Holthausen and Watts (2001) regarding the appropriateness of value-relevance regressions for standard-setting and hence evaluation of reporting regimes. Two types of tests are employed, see Biddle, Seow and Sie-

[4] The largest implementation effect on equity at the beginning of 2004 relative to the equity at the end of 2003 was caused by asset being revaluated to fair value (26%). The average change in initial equity value was 6%.

gel (1995). The first one, a two-sample unconditional comparison test, considers the two reporting regimes as independent samples.[5] The second one, a marginal dependent comparison test, takes one reporting regime as the base and looks at the marginal value-relevance of having access to the other, see Amir, Harris and Venuti (1993). In our case, the base is NGAAP and the reconciliation goes from NGAAP to IFRS.

Our price regression model takes the following form:

$$(1) \quad P'_t = \alpha_0 + \alpha_1 \cdot B'_{t-1} + \alpha_2 \cdot E_t + \varepsilon_t,$$

where P'_t is the inefficiency-adjusted share price quoted in the stock market at the end of year t. B'_{t-1} is the book value per outstanding share at time t-1 plus 'dirty surplus' in year t less net dividends per share in year t (i.e. dividends minus net capital expansions), as dividends have been paid out at the end of year t and are therefore not included in P'_t.[6] Consequently, $B'_{t-1} = B_t - E_t$, where B_t is the reported book value per share at time t and E_t is reported earnings per share in year t. E_t is subtracted from B_t to reduce collinearity and to obtain proper loading of E_t, cf. Footnote 7. Finally, α_0, α_1 and α_2 are the regression coefficients, while ε_t is the error term.

Following Aboody, Hughes and Liu (2002), the stock price in Model (1) has been adjusted for possible market inefficiency by calculating $P'_t = P_t \cdot (1 + r_{t+1})/(1 + k_{t+1})$, where P_t is the observed stock price at the end of year t, r_{t+1} is the forthcoming stock return in year t+1

[5] However, independency assumption could be loosened by employing Hausman's specification test, testing whether there are systematic differences between coefficients when allowing for a more general covariance matrix, see e.g. Green (2008, pp. 208-209) and Thursby (1985). On the other hand, this test could have small sample problems, preventing the covariance matrix from being positive definite. A small sample could also cause the test's asymptotic assumptions to fail. It could also be question whether one set of coefficient estimates are more efficient than the other set, an assumption yielding the special covariance structure implicitly imposed by the Hausman test.

[6] If, as is the case according to NGAAP, proposed dividends are reclassified as short-term debt, the dividends should be added back to equity from an equity investor perspective. In this way, the equity in annual accounts is reduced when dividends are paid out (or at least decided by the general assembly), as is the case according to IFRS. By doing so, the difference between NGAAP and IFRS caused by the misclassification of proposed dividends from an investor perspective will not become a disturbing element in our tests.

and k_{t+1} is the required rate of return in year t+1. This required return may be estimated by splitting r_{t+1} into size and book-to-price portfolios for all listed firms in year t+1, such that abnormal return, ar_{t+1}, equals r_{t+1} less the average stock return in the proper size and book-to-price portfolio, see Fama and French (1992). On average, the abnormal return for all firms will be zero in year t+1. The idea behind using P'_t in Model (1) is that in a possibly inefficient market, in which accounting information is slowly reflected in stock prices, the discounted value of the following year's stock price, $P_{t+1}/(1 + k_{t+1})$, is more representative for measuring value-relevance than this year's stock price, P_t. The length of the delayed response depends on the efficiency characteristics of the stock market and may vary from zero to several months, and even to several years in extreme cases.

The value-relevance of book value and earnings per share is measured by the adjusted R^2 from price regression (1). The difference between NGAAP and IFRS may be analyzed by a two-sample unconditional comparison test focusing on differences in adjusted R^2 and on statistical inference from the standard deviations of adjusted R^2 found in Cramer (1987), see also Harris, Lang and Möller (1994, Footnote 38). However, since the dependent variable, the stock price, is the same irrespective of reporting regime when utilizing a dataset of restated financial statements, the difference in adjusted R^2 could also be tested as in Lien and Vuong (1987) and Vuong (1989), see also Green (2008, pp. 137-142). When appropriate, the Vuong test is more powerful than the Cramer test. The small sample properties of especially the Cramer test have been questioned, see Hope (2007). The associated response coefficients, α_1 and α_2, indicate how book value and earnings influence market value. Furthermore, we may estimate the importance of various accounting items by analyzing coefficient changes between IFRS and NGAAP. Marginal changes in adjusted R^2 due to the inclusion of different accounting items also shed light on this issue. In a broader sense, the value-relevance of the balance sheet versus the income statement may be assessed, especially when substituting par-

titions of the book value and earnings into Model (1), such as assets and liabilities, revenues and costs, or finer partitions of these.

It is well known that price regressions do not satisfy all OLS-regression assumptions, heteroskedasticity and scale effects often have a disturbing impact on results.[7] Scale effects generally arise from the fact that larger firm have larger market capitalizations, larger book values and larger earnings as opposed to smaller firms, see e.g. Barth and Kallapur (1996), Brown, Lo and Lys (1999) and Easton and Summers (2003). Therefore, a cross-sectional regression of market capitalization on book value and earnings might not capture more than the existing scale variation. The adjusted R^2 in a regression with a common scale factor is thus overestimated.

The remedy for reducing scale effects is usually to deflate the market capitalization regression by the number of outstanding shares and thereby obtaining a price regression like Model (1). However, this model is also affected by scale problems since firms with a higher stock price typically have a higher book value per share and higher earnings per share relative to smaller firms. The remaining scale problems may thus be reduced by looking at the return regression specified by Model (2) below, which focuses on deflated changes in the market and accounting variables of Model (1), employing the previous year's stock price as the preferred deflator. Still, the price regression (1) may better capture the value-relevance of the balance sheet, as B is an explanatory variable only in Model (1) and not in Model (2) and (3).

The return regression model takes the following form:

$$(2) \quad r'_t = \beta_0 + \beta_1 \cdot e_{t-1} + \beta_2 \cdot \Delta e_t + \varepsilon_t,$$

[7] Due to possible heteroskedasticity, the t-values of the regression coefficients should be adjusted employing robust standard deviations, see White (1980). Even though accounting variables might be significantly correlated, multicollinearity is usually a minor problem. Notice that Model (1) extracts E from B in order to avoid double accounting of E and thereby potentially underestimating the earnings response coefficient. If E is included in B as suggested by for example Penman (1998), there will also be built-in multicollinearity in the empirical specification.

where the inefficiency-adjusted stock market return r'_t equals $r_t \cdot (1 + r_{t+1})/(1 + k_{t+1})$, in which r_t is the stock market return in period t. The earnings variable, e_{t-1}, is the earnings per share in year t-1 deflated by the stock price in year t-1, while the earnings change variable, Δe_t, is the change in earnings per share in year t deflated by the same stock price. Thus, $e_{t-1} = E_{t-1}/P_{t-1}$ and $\Delta e_t = \Delta E_t/P_{t-1}$. Model (2) includes one level-variable, e_{t-1}, one change-variable, Δe_t, and no built-in multicollinearity. Both variables are related to the income statement and not to the level of the balance sheet, suggesting that Model (2) may not be an appropriate way of evaluating the value-relevance of the balance sheet.

The value-relevance of the price-deflated earnings and the price-deflated change in earnings are measured by the adjusted R^2 of Model (2). The regression coefficients, β_1 and β_2, indicate the stock market return relevance of the earnings' level at time t-1 and of the change in earnings from t-1 to t. Any differences in response coefficients, adjusted R^2 and the marginal contribution to adjusted R^2 of various accounting items may be utilized to express the value-relevance of reporting standards like IFRS and NGAAP. Generally, the return regression (2) is considered to be less influenced by scale effect problems than the price regression (1). Stock market return possesses a scale dimension as it is determined by the expected or required rate of return, $E(r_t) = k_t$. This scale may accordingly be reduced by deducting the required rate of return from the realized return, i.e., by focusing on abnormal returns, $ar_t = r_t - E(r_t)$.

The abnormal return regression model takes the following form:

(3) $ar'_t = \phi_0 + \phi_1 \cdot \Delta e_t + \varepsilon_t$,

where ar'_t is the inefficiency-adjusted abnormal stock market return in year t. Since the required rate of abnormal return is zero, $ar'_t = (1 + ar_t) \cdot (1 + ar_{t+1}) - 1$ or $ar'_t = ar_t \cdot (1 + ar_{t+1})$.[8] The abnormal return equals stock return less the expected or required return from the stock market, $E(r_t \mid \beta_{t-1}, S_{t-1}, B_{t-1}/P_{t-1}, ...)$, which is based on conventional risk factors such as the stock's systematic risk (beta) and proxy risk factors such as firm size (e.g. measured by the logarithm of stock market equity value) and the firm's book-to-price ratio, see Fama and French (1992).[9]

The ability of the price-deflated change in earnings to explain abnormal stock market return is extracted from the adjusted R^2 and the earnings change coefficient ϕ_1 of Model (3). Since earnings may be decomposed into various income measures and ultimately into a number of revenue and cost items, the abnormal return regression may be used to evaluate the value-relevance of those items, including differences in reporting regimes like shifting from NGAAP to IFRS. Generally, the abnormal return regression (3) is less influenced by scale and other empirical problems than does the return regression (2). Although we follow the tradition by including results from price and return regressions, our conclusions regarding the value-relevance of earnings will primarily be based on our findings on abnormal stock market performance. Nevertheless, the price regression (1) is very suitable for assessing the value-relevance of the balance sheet.

Following Amir, Harris and Venuti (1993) and Barth and Clinch (1996), the reconciliation adjustment between two regimes may be evaluated by a marginal dependency test in

[8] There are alternative ways of calculating inefficiency-adjusted abnormal returns, e.g. $ar'_t = ar_t \cdot (1 + r_{t+1})/(1 + k_{t+1})$ and, if calculated by logarithms, $ar'_t = ar_t + ar_{t+1}$. Notice that there is a potential cost of this adjustment: It may add noise. If the added noise becomes significant, leading to a significant decrease in adjusted R^2, this cost might surpass the benefits of the inefficiency-adjustment.

[9] Abnormal returns may be estimated on a monthly basis using a two-step procedure: First, preliminary abnormal returns are estimated from a time-series 36 months back and collecting normal returns from the market model. Thus, the abnormal return is adjusted for systematic (beta) risk. Second, these abnormal returns are adjusted on the cross-section for all firms in a given year for size and book-price effects, conditioned on the requirement that the abnormal return for all listed firms should equal zero for every month over the year. This condition implies that the final abnormal returns also are adjusted for periodic effects like the well-documented January effect.

which the price, return or abnormal return regression given by Model (1), (2) or (3) is expanded by including the change in accounting variables for the two regimes. For instance, the expanded abnormal return regression is:

(4) $ar'_t = \phi_0 + \phi_1 \cdot \Delta e_t + \phi_2 \cdot \Delta\Delta e_t + \varepsilon_t,$

where $\Delta e_t = \Delta E_{NGAAPt}/P_{t-1}$ is the price-deflated earnings change according to the base accounting regime NGAAP, while $\Delta\Delta e_t = (\Delta E_{IFRSt} - \Delta E_{NGAAPt})/P_{t-1}$ is the difference in the earnings change between the two reporting regimes, deflated by the price. In this way, the marginal or incremental value-relevance of IFRS earnings may be tested from the originally reported NGAAP earnings, suggesting that a marginal increase in adjusted R^2 by including the IFRS earnings' reconciliation in Model (4) would be consistent with the IFRS figures being value-relevant on the margin. A significant response coefficient, ϕ_2, renders information about which accounting item is relevant if earnings are split into its underlying components, for instance net operating income, net financial cost and net non-recurring items. The marginal test is, however, less powerful than the two-sample unconditional comparison test for the value-relevance of altering an accounting regime. An advantage of using (4) is that the marginal increase in adjusted R^2 could be tested by a standard F-test as the NGAAP - regression is nested within the regression with reconcilement adjustments to IFRS, see e.g. Green (2008, pp. 89-90).

4. Data and Descriptive Statistics

In order to test the hypotheses specified in Section 3 regarding value-relevance differences between IFRS and NGAAP, we have utilized a sample in which the underlying economic events are identical.

- INSERT TABLE 1 ABOUT HERE –

According to Panel A of Table 1, 145 of the 219 firms listed on the Oslo Stock Exchange by the end of 2005 restated their NGAAP financial statements for 2004 to IFRS, a process governed by IFRS 1 *First Time Adoption of International Financial Reporting Standards*. In 2005, 14% of the firms listed on the OSE did not report according to IFRS since they do not disclose consolidated financial statements, have their primary listing on a non-European exchange or have temporary delayed the implementation of IFRS. Although our sample of financial statements according to both NGAAP and IFRS gives a unique opportunity to test the effects of switching to a different reporting regime, as we do not have to control for differences in the underlying economic activities, a few remaining considerations have to be made:

1) The 2004 IFRS figures are reported one year after the NGAAP figures.[10] Since more accurate information is available at the end of 2005, the IFRS figures for 2004 may be based on more precise accounting estimates than the NGAAP figures. For instance, if a business segment is for sale in 2005 and not in 2004, the 2004 IFRS statements would have reported this as a discontinuous operation to give comparable numbers to those for 2005, while it would have been reported as continuous operation in the original 2004-report. Consequently, the IFRS figures may be more value-relevant than their corresponding NGAAP figures. This bias in favor of IFRS is larger for the value-relevance of earnings components than for net earnings, as the net is not affected by reclassifications within the income statement (unless it affects 'dirty surplus').

[10] From 2004 to 2005, three firms shifted their reporting currency from NOK to USD or EUR. This may affect the scale, making the NGAAP figures more value-relevant in the price regression, but hardly in the return and in the abnormal return regression. Table 2 reveals that the effect on the average stock price is only 1.4%, implying only a negligible influence on scale even for the price regression.

2) Since 2005 was the first year of implementation, the IFRS accounting figures in 2004 may include non-recurring implementation effects, although they should be reflected in the opening balance sheet on January 1, 2004. Consequently, the IFRS figures may be less value-relevant because they contain implementation noise not present in the NGAAP figures. We control for this effect by splitting earnings into a recurring and a non-recurring component. If implementation effects create additional noise, this will contribute to making the non-recurring income less value-relevant according to IFRS as compared to NGAAP. Recurring income will be less affected.

3) Prices are quoted in the stock market based on available information. By the end of 2004, the OSE was able to price the NGAAP figures directly, as they were to a large degree publicly available, and to price the IFRS figures indirectly, as these figures had to be fully anticipated. Hence, the outlined test of value-relevance may be biased in favor of NGAAP. We control for this effect by adjusting for stock market inefficiency, utilizing the procedure outlined in Aboody, Hughes and Liu (2002). In our case, this procedure implies that stock market valuation is delayed for one year, until the end of 2005, thus making the IFRS figures publicly available. The values are discounted back to 2004, at the time when value-relevance differences are tested.

Our sample is reduced to 130 observations when value-relevance is evaluated by return and abnormal return regressions due to lacking data when calculating the change variables entering these two regressions, see Panel B of Table 1. With a limited sample size of 145 and 130, we do not remove potential outliers.[11] However, we shall analyze the effect of extreme observations as a robustness test, see Table 10. Table 2 presents our descriptive statistics.

[11] A potential criticism is that only 145 or 130 observations give little statistical power to reject the null hypothesis of IFRS and NGAAP are equally value-relevant. This criticism is correct if we were analyzing a sample and could expand the sample size. In our case, we have all observations available. The sample could be expanded by including other countries, but this approach will change the carefully selected benchmark for testing the value-relevance of adopting IFRS. Notice that if the universe of observations is studied, all differences are significant in principle – no tests are needed. However, we will not interpret our sample as the universe of observations, so tests are performed.

Panel A and B describe the variables entering the price, the return and the abnormal return regressions, respectively.

- INSERT TABLE 2 ABOUT HERE –

Based on the average value of stock price, book value and earnings per share, the price/ book-ratio is 1.527 according to IFRS and 1.534 according to NGAAP. The price/earnings-ratio is 11.622 according to IFRS and 12.763 according to NGAAP. Both multiples are higher according to NGAAP than IFRS, mainly because the average earnings per share reported according to NGAAP is somewhat lower than the corresponding IFRS figure; 5.670 versus 6.218. Earnings per share is 9.7% higher according to IFRS than NGAAP due to 5.0% higher net operating income, 31.8% lower net financial costs and 5.9% higher net non-recurring income. The operating revenue per share of IFRS is 6.1% below the corresponding value for NGAAP. This stems primarily from the reclassification from continuous to discontinuous operations in retrospect, which are reported as non-recurring. This also reduces operating costs per share. The net operating margin increases from 5.0% to 5.6%, suggesting that IFRS allow for reporting less operating costs. According to IFRS, and unlike NGAAP, goodwill is not amortized; instead it is tested annually for impairment.

To avoid operating with a relatively small tax component in our regressions, as would have been consistent with the format of the income statements, the tax (both payable and change in deferred) has simply been allocated to each income component, cf. Penman (2006). NOI, net operating income, or NOPAT, net operating profit after taxes, is the recurring operating revenue, ORE, with the deduction of recurring operating cost, OCO, including allocated operating taxes. Net financial costs, NFC, is recurring financial cost less recurring financial revenue plus the tax advantage of having net financial debt. Net unusual income, NUI, con-

sists of non-recurring operating income less non-recurring financial cost less allocated taxes on these items. On average, NUI is positive and relatively large in 2004. Operating items classified as unusual are impairment losses on fixed and intangible assets, restructuring charges, huge losses or gains on sale of fixed and intangible assets, net income from discontinuous operations and other operating items indicated in the financial statement as special. Other operating items are classified as usual and included in the NOI. Financial items classified as unusual are impairment losses, currency losses and gains, huge losses and gains obtained by selling net financial assets and financial items indicated in the financial statements as special. Other net financial costs are classified as usual and included in the NFC.

Panel B of Table 2 reports descriptive statistics for variables in the return and the abnormal return regressions. In 2004, the average stock market return is 29.2%, while the average estimated abnormal return is -1.9% (the abnormal return for all firms listed on the OSE in 2004 is, of course, zero. High stock market returns are consistent with non-recurring gains and thus with reporting a positive and relatively high net unusual income per share. The earnings per share in 2003 deflated by that year's stock price, $e_{t-1} = E_{t-1}/P_{t-1}$, is -1.3% both according to IFRS and to NGAAP. There is available accounting data for 2003 only according to NGAAP, and these figures are taken as the basis for computing changes in 2004, both when changes are computed in line with IFRS and in line with NGAAP. Consequently, the level of deflated net operating income, net financial cost and net unusual income are identical for the two reporting regimes.

The change in price-deflated earnings in 2004, $\Delta e_t = \Delta E_t/P_{t-1}$, is 9.3% according to IFRS and 7.9% according to NGAAP. This difference could also be traced from the fact that the deflated change in net operating income, Δnui, is 2.1% according to IFRS and 1.2% according to NGAAP; the deflated change in net financial cost, Δnfc, is -0.8% according to IFRS and -0.6% according to NGAAP, while the deflated change in net non-recurring or unusual in-

come, Δnui, is 6.4% according to IFRS and 6.0% according to NGAAP. In 2004, the accounting return on market-based equity, E_t/P_{t-1}, is 8.0% according to IFRS and 6.6% according to NGAAP. Thus, the firms seem to be more profitable according to their IFRS figures, see Section 2.

5. Test Results and Analyses

To test whether IFRS financial statements are more value-relevant than NGAAP financial statements, we start by calculating binary correlations between market variables, i.e. price, return or abnormal return, and the corresponding accounting variables. Next, we utilize multiple OLS regressions, i.e. Model (1), (2) and (3), in which the accounting-based variables specified according to the two reporting regimes enter simultaneously, to explain the corresponding market-based variable.[12] Pairs of unconditional IFRS and NGAAP regressions are also extended by their conditional or marginal counterparts, for instance is Model (3) extended to Model (4). Finally, the robustness for emphasizing different components of value-relevance, such as firm size, intangible assets intensity and firm profitability, is analyzed by using multiple WLS regressions.

5.1 Binary Correlations

Panel A of Table 3 reports binary correlations for the price regression (1) with no adjustment for possible market inefficiency. The lower left part of the matrix reports Pearson correlation coefficients for the IFRS figures and the upper right part reports the correlations for the NGAAP figures.

[12] The t-values of the OLS coefficients are based on heteroskedasticity-adjusted estimates of the standard deviations, see White (1980). Since our sample size N is less than 250, we utilize the HC3-estimate, see MacKinnon and White (1985) and Long and Erwin (2000).

- INSERT TABLE 3 ABOUT HERE -

The correlation between stock price and book value per share is 88.9% according to IFRS and 84.5% according to NGAAP, suggesting an R^2 of 79.0% and 71.5%, respectively. The stock price seems to be more strongly correlated with the balance sheet for IFRS figures. The difference in R^2 of 7.5 percentage points is significantly different from zero at the 10%-level.[13] The correlation between stock price and earnings per share is 73.5% according to IFRS and 78.7% according to NGAAP, suggesting an R^2 of 54.0% and 61.9%, respectively. The stock price seems to be more strongly correlated with the income statement when NGAAP are used. Nevertheless, the difference in R^2 of 7.9 percentage points is not significant. This result is consistent with the claim that NGAAP are more earnings-oriented than IFRS, while IFRS are more balance-oriented than NGAAP, cf. the discussion of this difference in conceptual orientation in Section 2.

Panel B of Table 3 reports that the correlation between unadjusted stock market return and the initial price-deflated level of earnings is -0.076, according to both IFRS and NGAAP, suggesting an R^2 of merely 0.6%. The correlation between stock return and price-deflated change in earnings is 0.435 according to IFRS and 0.434 according to NGAAP, suggesting an R^2 of approximately 19% in both cases. Return correlations provide no significant difference in value-relevance. Furthermore, the correlation between unadjusted abnormal return and change in earnings is 0.475 according to IFRS and 0.479 according to NGAAP, implying an R^2 of 22.6% and 22.9%, respectively. Again, there is no significant difference between the

[13] The t-value of R^2 and adjusted R^2 are based on the standard deviation found in Cramer (1987), and the t-value of differences in adjusted R^2 is based on the assumption of two independent samples, see Harris, Lang and Möller (1994, Footnote 38). The independency assumption makes the test conservative (as long as the unmeasured correlation is positive), suggesting that the power is higher than indicated by the reported p-value indication asterisk. However, the effect of the independency assumption could be explored by Hausman's specification test, allowing a more general covariance matrix, though positive definite, cf. e.g. Green (2008, pp. 208-209). The Vuong test based on Lien and Vuong (1987) and Vuong (1989) is postponed to the return and abnormal return regressions as the price regressions contains three pair of observations with shifting exchange rates, see Footnote 10 and 15.

two reporting regimes. The same finding appears when analyzing the underlying components of the earnings change, i.e. Δnoi, Δnfc and Δnui. Before concluding, however, the correlation results should be examined with all accounting variables included simultaneously, i.e. by performing multiple regressions.

We observe from Panel B of Table 3 a positive serial correlation in abnormal returns of 0.384, suggesting that 14.7% of the variation in the following year's abnormal return is explained by the current year's abnormal return. Furthermore, there is a significant correlation between the price-deflated change in net unusual income and the following year's abnormal return, which is consistent with the post-earnings announcement drift revealed by Bernard and Thomas (1989). The coefficient is 0.199 or 0.207, depending on whether IFRS or NGAAP are used; suggesting that approximately 4% of next year's abnormal return is explained by the current net non-recurring income. These findings challenge the pricing efficiency of Norwegian capital markets and underscore that regressions should be adjusted for possible effects of an inefficient market by following the procedure developed by Aboody, Hughes and Liu (2002).

5.2 Multiple OLS Price Regressions

Table 4 presents price regressions based on both IFRS and NGAAP. Panel A reports the unadjusted price regression and Panel B gives the inefficiency-adjusted price regression with book value per share and different decompositions of earnings per share as explanatory variables.

- INSERT TABLE 4 ABOUT HERE -

We learn that the results from the inefficiency-adjusted price regression are similar to the corresponding unadjusted regression. The adjusted R^2 increases in the inefficiency-adjusted regressions; the difference of 2.8 percentage points on average is, however, not significant. The regression coefficient of the book value becomes closer to 1 and the regression coefficient of earnings becomes larger after opening for accounting information being slowly incorporated into the stock price. This is consistent with the inefficiency-adjustment effects on the price regression observed in Aboody, Hughes and Liu (2002; Table 2).

In the inefficiency-adjusted price regression, NGAAP seem to be more value-relevant than IFRS, the difference in adjusted R^2 is 3.1 percentage points in favor of NGAAP. The response coefficient of earnings is higher for NGAAP than for IFRS, whereas the response coefficient of equity is lower. Since the coefficients are correlated across reporting regimes, a Hausman test could be used, see e.g. Green (2008, pp. 208-209). This test should only be performed if the covariance matrix is positive definite, which needs not be the case in small samples. If a positive definite covariance matrix is secured, e.g. by assuming homoskedastic error terms, the null hypothesis of no systematic difference in coefficients is rejected at the 1%-level. This indicates that the observed difference could be more significant than what is reported from the standard t-tests in Table 4, in which no correlation implicitly is assumed. When earnings per share are split into net operating income, net financial costs and net unusual income per share, the difference in adjusted R^2 increases at 5.4 percentage points, which is significantly different from zero at the 1%-level. No regression coefficient in the IFRS and NGAAP regressions is significantly different according to the simple t-test. The standard Chow test (represented by the F-value), testing for jointly differences in the coefficients, comes up with the same conclusion. On the other hand, the Hausman test reveals that the structural difference in the coefficients is significant at the 1%-level, again after securing a positive definite covariance matrix. Based on inefficiency-adjusted price regressions, we are

thus not able to conclude that IFRS represent a significant improvement in value-relevance as compared to NGAAP.

A supplementary approach to evaluating the value-relevance of adopting IFRS is to analyze the marginal increase in value-relevance for stock market investors having access to the NGAAP accounting figures and then obtaining the IFRS figures, see Model (4). Table 5 presents the results for the inefficiency-adjusted regressions, where changes in book value and earnings due to IFRS adoption are separate explanatory variables.

- INSERT TABLE 5 ABOUT HERE -

According to Panel A, the change in equity and earnings from NGAAP to IFRS has had a marginal effect on the adjusted R^2 of 2.9 percentage points. Horton and Serafeim (2007), employing a similar regression model, observe a marginal increase of 0.7 percentage points relative to UKGAAP, see their Table 5. As in Horton and Serafeim, the marginal increase in adjusted R^2 and the restatement coefficients in our study are not significant. However, when tested jointly, the hypothesis that all restatement coefficients are zero is rejected at the 10%-level. Still, no individual coefficients are significant. Horton and Serafeim find no significant effect caused by restating the book value, but a significant positive effect at the 2%-level caused by restating earnings from UKGAAP to IFRS.

When we replace the change in earnings due to the adoption of IFRS with its underlying components, the marginal increase in adjusted R^2 increases at 4.3 or 4.5 percentage points, which is significant at the 10%-level. The joint hypothesis of zero coefficients is rejected at the 5%-level. However, none of the individual restatements coefficients are significantly dif-

ferent from zero, making it difficult to pinpoint what exactly leads to the increased value-relevance.[14]

Panel B reports the result of running stepwise regressions with forward inclusion of the IFRS adoption variables. The starting point is the regression with NGAAP book value and earnings as explanatory variables. Next, an IFRS adoption variable is added if, and only if, the yielding coefficient is significant. Only the restatement of the book value qualifies, since its regression coefficient is significant at the 1%-level, while all the variables related to the restatement of earnings do not. Hence, the marginal value-relevance of the adoption of IFRS relative to NGAAP is related to the restatement of the equity book value and thereby to the balance sheet.

The analyses based on price regressions lead to the following conclusion: When evaluated unconditionally, the value-relevance of NGAAP is significantly higher than the value-relevance of IFRS, as measured by the difference in adjusted R^2 for the two reporting regimes. The value-relevance of the income statement (earnings) decreases, but the value-relevance of the balance sheet (equity) increases. Furthermore, IFRS have a marginal improvement in value-relevance relative to NGAAP, i.e. investors having access to the NGAAP financial statements also find valuable additional information in the corresponding IFRS financial statements. Of particular relevance is the restatement of the book value of equity – a result consistent with the view that more fair values in the balance sheet increase value-relevance. This is an intuitively appealing result.

[14] Notice that the regression coefficient for the change in net financial costs due to the implementation of IFRS relative to NGAAP is significantly positive at the 10%-level in one of the two regressions in Panel A of Table 5. This result is counterintuitive. If we run the same regressions with less weight on 'extreme' observations, the coefficient is still positive, although not significant (t-value = 1.021).

5.3 Multiple OLS Return Regressions

Table 6 contains the results of the return regression (2). Panel A presents the unadjusted return regressions and Panel B presents the inefficiency-adjusted return regressions, in which price-deflated earnings and change in earnings have been decomposed into their underlying incomes.

- INSERT TABLE 6 ABOUT HERE -

We learn that the results from the inefficiency-adjusted return regressions are similar to the corresponding unadjusted regressions. However, the adjusted R^2 goes down in the inefficiency-adjusted regressions; the difference is on average 1.6 percentage points, which is not significant. This effect of adding noise questions the effectiveness of the inefficiency-adjustment procedure, and shows that the adjustment may come at a cost. Still, both the regression coefficients of price-deflated earnings level and earnings change become higher after opening for accounting information is being slowly incorporated into stock prices. This observation is consistent with the adjustment effects observed in Aboody, Hughes and Liu (2002; Table 3).

According to both the unadjusted return regressions and the three inefficiency-adjusted return regressions, there is no difference in adjusted R^2 due to reporting, neither according to IFRS nor according to NGAAP.[15] The change in accounting return on market-based equity is as value-relevant according to IFRS as it is according to NGAAP, while the level of the accounting return is only partly value-relevant in both cases. The lower significance of level return of market-based equity may be related to the fact that the return on the book value of

[15] The t-value of adjusted R^2 is based on the standard deviation found in Cramer (1987), and the t-value of differences in adjusted R^2 is based on Lien and Vuong (1987) and Vuong (1989), since the stock return is the same for the IFRS and NGAAP firms. The finding of no significant differences is confirmed by Hausman's specification test.

equity in 2003 on average was negative, cf. Table 2, Panel B. Negative earnings is more transitory and therefore less value-relevant than positive earnings, see Hayn (1995). The change from 2003 to 2004 was 9.3%, and its significant correlation with the stock market return is 29.2%, cf. Panel B of Table 3.

From Table 7 we learn that the implementation of IFRS yields no significant marginal value-relevance when measured by the adjusted R^2 – even though the largest change in R^2 is about 6.4 percentage points.

- INSERT TABLE 7 ABOUT HERE -

However, when we analyze the structural change in the coefficients due to the adoption of IFRS, one result stands clear.[16] The change in deflated net operating income is highly value-relevant. This result is also found when we split the deflated net operating income into deflated operating revenue and costs. It seems that IFRS, on the margin, give more value-relevant information about the operating revenue recognition and expensing relative to the corresponding NGAAP figures.

Our analysis based on return regressions leads to the following conclusion: The value-relevance of NGAAP is not significantly different from the value-relevance of IFRS, when evaluated unconditionally. Implementing IFRS increases value-relevance relative to NGAAP due to the change in net operating income, and thereby also for operating revenue and cost, including operational taxes.

[16] Notice that the regression coefficient of the change in net unusual income due to the implementation of IFRS relative to NGAAP is significantly negative at the 10%-level in one of the two regressions in Panel A of Table 7. This result is counterintuitive. If we run the same regression with less weight on 'extreme' observations, the coefficient is still negative, although not significant (t-value = -1.539).

5.4 Multiple OLS Abnormal Return Regressions

The results from running the abnormal return regression (3) are presented in Table 8. Panel A contains the regressions explaining current year's abnormal return, expanded by a factor containing next year's abnormal return, while Panel B contains the regression explaining current year's abnormal return.

- INSERT TABLE 8 ABOUT HERE -

Unlike in Table 4 and Table 6, the effect of adjusting abnormal return for possible stock market inefficiency is questionable. Notice that the adjusted R^2 falls on average from 22.2% in Panel B to 16.1% in Panel A, a significant decrease of 6.1 percentage points. The cost of the inefficiency-adjustment is that it may in this case add considerable noise, so we choose to present the results from the unadjusted abnormal return regressions. A robustness test will be employed to test whether the obtained results also hold in the inefficiency-adjusted case.

We observe from Table 8 that the result from our return regressions is confirmed. There is no significant difference between the value-relevance of IFRS and NGAAP.[17] Nevertheless, the change in accounting return on market-based equity is highly relevant for explaining abnormal stock market return. This result is driven by changes in operating revenue, costs and hence net operating income and by changes in net non-recurring or unusual income.[18] The effect caused by net financial costs is less significant or even not significant, even though the coefficient is large.

[17] However, Hausman's specification test reveals that the structural coefficient differences when the return is explained by deflated changes in net operating income, net financial costs and net unusual income are significant.

[18] The significance of non-recurring items such as write-offs is consistent with the findings of for example Francis, Hanna and Vincent (1996). Although significant, the weight on non-recurring income is considerable less than and in this respect less value-relevant than recurring net operating income. This observation is consistent with the findings of Elliott and Hanna (1996). Non-recurring items are less persistent and hence less value-relevant.

Our result from the return regressions is also confirmed in Table 9, as we observe significant marginal contributions of adopting IFRS due to the restatement of the net operating income, cf. Model (4). Both the reconciliation adjustment of the operating revenue and costs are significant.

- INSERT TABLE 9 ABOUT HERE -

The finding that reconciliation adjustment of operating costs from NGAAP to IFRS is value-relevant is consistent with the results of Horton and Serafeim (2007). Among the accounting items causing value-relevance differences between UKGAAP and IFRS is goodwill, making this, or more generally, accounting for intangible assets a candidate for causing value-relevance differences between NGAAP and IFRS, cf. Section 2 for an overview of the accounting differences and Section 5.5 for further analyses into the sources of what is causing value-relevance differences.

The analysis based on abnormal return regressions leads to the following conclusion: There is little evidence that the difference in value-relevance between IFRS and NGAAP is significant when they are evaluated unconditionally. Based on the marginal increase, IFRS are incremental value-relevant relative to NGAAP, which is caused by the reconciliation adjustment of net operating income, both operating revenue and operating costs. Our final analysis is to investigate whether these results are driven by a few extreme observations or by underlying characteristics like industries, firm size, intangible asset intensity and firm profitability, which also will shed light on the robustness of our results. Notice that the effect of non-recurring items is controlled for directly in the partition of the price-deflated earnings change.

5.5 Robustness Tests and Further Analyses of the Sources of Identified Value-Relevance Differences

Our first robustness test is to investigate whether the results in Table 8 and 9 are driven by a few extreme observations. Since removing potential outliers has the effect of reducing noise, we reintroduce the noisier inefficiency-adjusted abnormal return variable as an alternative approach in order to focus on the unadjusted abnormal return variable, cf. the discussion of the results in Table 8, Panel A versus B. Panel A of Table 10 reports the inefficiency-adjusted results when the 1% highest and 1% lowest Dfbetas of all accounting-based observations in Model (3) and (4) are excluded, given that the outcome is a matched set of observations between IFRS and NGAAP. Dfbeta is a measure of each observation's influence on the coefficient estimates, variable by variable. Panel B reports the corresponding results when the 5% highest observations of Cook's D are dropped. D is a measure of how influential each observation is on the regression's overall outcome.

- INSERT TABLE 10 ABOUT HERE -

In Panel A of Table 10, we learn that the two-sample unconditional comparison test reveals no difference in the coefficient structure between the IFRS and NGAAP regressions, as previously found in Table 8. However, the regression coefficient of the change in net operational income is 2.088, as compared to 1.257 in Table 9. The former estimate is significant at the 1%-level and the result of the F-test for the joint hypothesis that all IFRS related variables are zero, is also significant.

In Panel B, we report no difference in the coefficient structure between the IFRS and NGAAP regressions from the two-sample unconditional comparison test, as previously found in Table 8. We observe that the regression coefficient of the change in net operating income is

estimated at 1.833 and that it is significant at the 1%-level. This improvement, as compared to the results of Table 9, suggests that the value-relevance of adjusting net operating income from NGAAP to IFRS does not depend on a few observations with a substantial impact. However, our findings and conclusions are strengthened in significance when removing potential outliers. The reintroduction of the inefficiency-adjustment introduces some noise and thus reduces the statistical significance of the results, but not to such an extent that the results become insignificant.

The second robustness test is to use a random coefficient model to control for potential industry effects (see e.g. Green (2008, pp. 222-238) for a discussion of mixed models). The firm observations are divided into 11 broad industries. The regression coefficients are estimated to include a fixed universal term and a (random) term varying across industries. We do not table the results, i.e. the fixed coefficients. But our finding that the marginal value-relevance difference between IFRS and NGAAP is driven by the reconciliation adjustment of the net operating income is also significant at the 1%-level within this type of regression models.

Our third robustness test is to analyze whether firm size affects the results. Size is measured by the logarithm of market value.[19] The results are only reported, not tabled. We find no changes in the differences in value-relevance between IFRS and NGAAP for neither large nor small firms, while the differences for net operating income are significant for both large and small firms. We perform statistical tests for possible differences when weighting small versus large firms and find no significant differences appear. Size is no driver of value-relevance differences in our sample.

[19] The value-relevance of large firms' financial statements is expected to be higher than for small firms. Large firms have more intensive analyst following, suggesting that accounting information is more easily incorporated into stock market value. In addition, small firms are more likely to report losses, suggesting less value-relevance, see Collins, Pincus and Xie (1999). However, our sample indicates no difference in value-relevance on the basis of firm size.

The fourth robustness test is to analyze whether the intangible asset intensity may influence the results.[20] Table 11 reports. Panel A shows the abnormal return regression results when the regression is weighted according to reported intangible assets (in percentage of total assets), while Panel B presents the results when the regression is weighted according to the inverse, i.e. according to fixed and financial assets.

- INSERT TABLE 11 ABOUT HERE -

Once again, our results from the previous subsection pass the robustness test. The coefficient of the net operating income is significant in both Panel A and Panel B. However, in Panel A, the F-test becomes significant at the 1%-level, suggesting that the additional insight provided by IFRS to some extent may be related to intangible assets. Panel C performs formal tests for differences between the coefficients in Panel A and Panel B.[21] One of them turns out to be significant at the 5%-level, i.e. intangible-intensive firms disclose a more value-relevant net operating income according to IFRS than according to NGAAP. For instance, annual impairment tests according to IFRS may be a more appropriate way of accounting for goodwill than annual amortization according to NGAAP.[22] More capitalization of development expen-

[20] Lev and Zarowin (1999) argue that the value-relevance of financial reporting has been affected negatively because the importance of unreported intangible assets has grown over time. The reason is that expenditures on most intangibles are expensed as incurred and not treated as investments that are recognized as assets in the balance sheet. Capitalization of intangibles is highly value-relevant, see Lev and Sougiannis (1996) and Aboody and Lev (1998). Our findings confirm that firms with a high degree of intangible asset recognition have more value-relevant accounting numbers than do firms with a low degree, cf. Panel A versus Panel B.

[21] To check the robustness of this result, we also divide the sample into two parts – firms with more than 10% intangible assets and firms with less than 10% intangible assets. The 56 most intangible-intensive firms have a coefficient from net operating income at 9.213 while the other 74 firms have 1.206. The difference of 8.007 has a t-value of 2.628 and is significant at the 5%-level. The difference in adjusted R^2 between the two samples is 0.407 with a t-value of 3.535, which is significant at the 1%-level. However, we believe that weighting the sample monotonically reflects the contents of the data set more appropriately than 'arbitrarily' splitting the data into two parts.

[22] Nevertheless, direct tests of the value-relevance of goodwill impairment losses versus systematic amortization indicate that amortization dominates impairment, see e.g. Chambers (2006) and Li and Meeks (2006) for some recent evidence. These findings challenge our claim on goodwill impairments and pinpoint capitalization and subsequent amortization of development expenditures expedited to produce future benefits as the most likely

ditures according to IFRS than NGAAP may cause the same result, as the option in NGAAP to capitalize rarely has been used. Our finding that IFRS introduce an additional value-relevance relative to NGAAP, due to differences in the reporting of intangible assets, is consistent with the finding of Horton and Serafeim (2007) that the reconciliation goodwill adjustment from UKGAAP to IFRS is value-relevant.

Our final robustness test is to analyze whether firm profitability may affect the results.[23] Table 12 reports. Panel A presents the abnormal return regression results when the regression is weighted according to the rank of the accounting return on the book value of equity, while Panel B presents the results when the regression is weighted according to the inverse, i.e. according to the rank of the negative value of return on equity, in order to measure the degree of inverse profitability.

- INSERT TABLE 12 ABOUT HERE -

Table 12 shows that the value-relevance of IFRS is higher for profitable firms, while the value-relevance of NGAAP is higher for unprofitable firms. The Voung test yields significance at the 1%- and 10%-level, respectively. But our result of an improved value-relevance from IFRS, caused by additional information reported through the net operating income, is replicated only when more weight is given to unprofitable firms – and not when more weight is given to profitable firms. This may seem as a contradiction. However, IFRS may be more adequate for profitable intangible-intensive firms than NGAAP, whereas for unprofitable intangible-intensive firms, NGAAP have the same quality as IFRS; although IFRS are margin-

explanation for our observation, see Lev and Sougiannis (1996) and Aboody and Lev (1998) for consistent evidence on the value-relevance of intangible asset capitalization.

[23] Hayn (1996) demonstrates that firms reporting negative earnings have less earnings response coefficients than those who do not. This finding suggests that value-relevance of financial reporting may be affected by the profitability of the firm. Panel A and Panel B of Table 12, however, yield no uniform difference between firms with high and low profitability.

ally value-relevant. Panel C demonstrates that the difference in marginal value-relevance of IFRS between profitable and unprofitable firms is not significant, again suggesting that we cannot reject stability.[24]

Summarizing the robustness results that net operational income has marginal value-relevance when adopting IFRS relative to NGAAP, we find that this result is valid particularly for firms with relatively high intangible asset intensity, which tend to be unprofitable. This suggests that IFRS are marginally more powerful in accounting for intangible assets. Unconditionally, IFRS earnings are also more adequate than NGAAP earnings for intangible-intensive firms, which tend to be profitable.

6. Conclusions

Our main conclusion is that the value-relevance of key accounting figures prepared according to IFRS is not superior to the corresponding figures prepared according to NGAAP, when they are evaluated unconditionally and conservatively as two independent samples. This result is robust against empirical specifications in which firm size, intangible asset intensity, profitability and the degree of non-recurring items are controlled for.

When analyzing the marginal value-relevance of adopting IFRS for firms already reporting according to NGAAP, these results appear:

- Stock holders' equity reported according to IFRS is on the margin more value-relevant as compared to a balance sheet reported according to NGAAP, since more fair values increase value-relevance.

[24] Splitting the sample into two parts, according to whether firms have a positive or negative return on equity, yields this result: The coefficient of the net operating income is 3.003 in the sample of 34 unprofitable firms and 1.296 in the sample of 96 profitable firms. The difference of 1.707 is not significant, which is consistent with the weighted regression result.

- A normalized net operating income reported according to IFRS is on the margin more value-relevant as compared to a corresponding NGAAP figure, especially for intensive intangible assets firms.

For firms with a high degree of intangible assets, the main difference between IFRS and NGAAP is the reporting of goodwill and R&D-expenditures, cf. the overview in Section 2. Although it is not substantiated directly by our statistical tests, we believe that IFRS are marginally more value-relevant than NGAAP due to goodwill impairments instead of goodwill amortization. Acquisition cost allocated to goodwill remains in the balance sheet, making the IFRS balance sheet more value-relevant on the margin. In addition, the marginal value-relevance result might prevail due to more capitalizing of development expenditures at costs in the balance sheet according to IFRS, relative to the practice of expensing such expenditures according to NGAAP, even though NGAAP gives an option to capitalize. More assets and measuring them at fair values in the balance sheet increases value-relevance (cf. the price regression result), and to the extent that they are measured at cost, they also contribute to the value-relevance of net operating income (cf. the return and abnormal return regression results).

The advantage of adopting IFRS has been widely discussed and questioned in countries characterized by having a developed accounting regulation prior to IFRS. Although our empirical findings show that the unconditional value-relevance of IFRS is not larger than that of NGAAP, and, thus, raise some doubt about the superiority of the balance sheet orientation, our marginal dependency findings demonstrate that IFRS have marginal value-relevance relative to NGAAP. We believe that these benefits might very well outweigh the implementation costs, especially when taking into account the positive effects of a harmonization leading to increased value-relevance in countries with a less developed accounting system, an advantage for all investors investing in the international capital market.

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Tables

Table 1
Sample Selection

Panel A
GAAP Used by OSE Listed Firms in 2004 and 2005

GAAP	2004		2005
	Initially Reported	IFRS Restatements in 2005	
IFRS	2	1	188
NGAAP	167	145	16
USGAAP	10	2	10
SGAAP	4	4	0
CGAAP	2	0	4
DKGAAP	1	1	0
HKGAAP	1	0	1
UKGAAP	1	1	0
Listed on OSE	**188**		**219**

Panel B
Sample

	Observations – Full sample	
	Level	Change
IFRS restatements from NGAAP	**145**	**130**

List of reporting regimes used on the Oslo Stock Exchange (OSE): IFRS = International Financial Reporting Standards, NGAAP = Norwegian Generally Accepted Accounting Principles, USGAAP = United States Generally Accepted Accounting Principles, SGAAP = Swedish Generally Accepted Accounting Principles, CGAAP = Canadian Generally Accepted Accounting Principles, DKGAAP = Danish Generally Accepted Accounting Principles, HKGAAP = Hong Kong Generally Accepted Accounting Principles and UKGAAP = United Kingdom Generally Accepted Accounting Principles. In 2005, 145 companies listed on OSE restated their financial statements for 2004 according to IFRS. These statements were originally prepared according to NGAAP. This means that 145 financial statements are available both according to IFRS and NGAAP. When computing changes in accounting variables from 2003 to 2004, the NGAAP financial statements for 2003 are used as a basis for the 2004 changes both according to IFRS and NGAAP. 15 of the 145 companies are registered without accounting data for 2003.

Table 2
Descriptive Statistics

Panel A
Price Regression Variables

N = 145	IFRS					NGAAP				
	Mean	**St.dev.**	**Q_1**	**Med.**	**Q_3**	**Mean**	**St.dev.**	**Q_1**	**Med.**	**Q_3**
P	**72.264**	100.403	8.890	28.500	87.500	**72.365**	100.333	9.100	28.500	87.500
B	**41.181**	65.227	2.465	12.821	43.084	**41.489**	63.988	2.857	11.964	48.790
E	**6.218**	13.757	0.003	1.430	5.915	**5.670**	13.869	-0.048	1.373	4.883
ORE	**87.550**	213.631	4.184	21.747	79.486	**93.200**	237.395	5.548	23.325	81.084
OCO	**82.677**	208.011	4.082	19.278	70.971	**88.561**	233.287	6.288	21.869	74.006
NOI	**4.873**	8.738	0.014	1.287	5.855	**4.639**	8.439	0.015	1.169	5.612
NFC	**0.457**	2.398	-0.002	0.015	0.416	**0.670**	2.598	0.000	0.030	0.549
NUI	**1.802**	12.303	-0.059	0.000	0.418	**1.701**	11.754	-0.216	-0.002	0.336

Panel B
Return and Abnormal Return Regression Variables

N = 130	IFRS					NGAAP				
	Mean	**St.dev.**	**Q_1**	**Med.**	**Q_3**	**Mean**	**St.dev.**	**Q_1**	**Med.**	**Q_3**
r	**0.292**	0.433	0.072	0.254	0.504	**0.292**	0.433	0.072	0.254	0.504
e	**-0.013**	0.265	-0.010	0.042	0.080	**-0.013**	0.265	-0.010	0.042	0.080
Δe	**0.093**	0.231	-0.011	0.024	0.094	**0.079**	0.233	-0.008	0.019	0.073
ore	**1.618**	2.466	0.402	0.812	2.017	**1.618**	2.466	0.402	0.812	2.017
oco	**1.576**	2.406	0.355	0.701	1.999	**1.576**	2.406	0.355	0.701	1.999
noi	**0.042**	0.127	-0.004	0.039	0.082	**0.042**	0.127	-0.004	0.039	0.082
nfc	**0.023**	0.050	0.000	0.006	0.024	**0.023**	0.050	0.000	0.006	0.024
nui	**-0.033**	0.172	-0.015	0.000	0.009	**-0.033**	0.172	-0.015	0.000	0.009
Δore	**0.041**	0.646	-0.126	0.013	0.113	**0.165**	0.565	-0.069	0.035	0.163
Δoco	**0.021**	0.650	-0.138	0.008	0.099	**0.153**	0.579	-0.075	0.050	0.171
Δnoi	**0.021**	0.099	-0.015	0.010	0.050	**0.012**	0.119	-0.020	0.010	0.044
Δnfc	**-0.008**	0.028	-0.009	0.000	0.002	**-0.006**	0.026	-0.006	0.000	0.003
Δnui	**0.064**	0.196	-0.003	0.002	0.044	**0.060**	0.187	-0.003	0.000	0.026
ar	**-0.019**	0.456	-0.240	-0.057	0.132	**-0.019**	0.456	-0.240	-0.057	0.132

P = the stock price at the end of year t, B = the book value per share at the end of t minus the earnings per share during t, E = the earnings or net income per share during t, ORE = operating revenue per share, OCO = operating cost per share, including allocated operating tax, NOI = net operating income (or net operating profit after tax, NOPAT) per share; NFC = net financial costs per share, i.e. financial cost after financial revenue and tax benefit, NUI = net unusual or non-recurring income per share, r is the stock market return and ar = abnormal return in year t. Δ denotes changes in a variable. The variables in small letters e, ore, oco, noi, nfc and nui are the price-deflated variables corresponding to capital letters, i.e. e = E/P, ore = ORE/P, oco = OCO/P, noi = NOI/P, nfc = NFC/P and nui = NUI/P.

Table 3
Pearson Correlation Matrix

Panel A
Price Regression Variables – IFRS Lower Left Part; NGAAP Upper Right Part

N = 145	P	B	E	NOI	NFC	NUI
P	**1.000*****	0.845***	0.787***	0.883***	0.201**	0.339***
B	0.889***	**1.000*****	0.688***	0.699***	0.167**	0.348***
E	0.735***	0.724***	**1.000*****	0.593***	0.176**	0.793***
NOI	0.815***	0.756***	0.512***	**1.000*****	0.136	0.012
NFC	-0.059	0.045	0.122	0.118	**1.000*****	0.332***
NUI	0.231***	0.281***	0.778***	-0.115	0.247***	**1.000*****

Panel B
Return and Abnormal Return Regression Variables – IFRS Lower Left Part; NGAAP Upper Right Part

N = 130	r_t	ar_t	ar_{t+1}	e_{t-1}	Δe_t	Δnoi_t	Δnfc_t	Δnui_t
r_t	**1.000*****	0.656***	-0.183**	-0.076	0.434***	0.263***	-0.148*	0.351***
ar_t	0.656***	**1.000*****	0.384***	-0.382***	0.479***	0.265***	-0.151*	0.405***
ar_{t+1}	-0.183**	0.384***	**1.000*****	-0.220**	0.128	-0.092	-0.079	0.207**
e_{t-1}	-0.076	-0.382***	-0.220**	**1.000*****	-0.593***	-0.164*	0.256***	-0.597***
Δe_t	0.435***	0.475***	0.113	-0.632***	**1.000*****	0.512***	-0.265***	0.880***
Δnoi_t	0.351***	0.318***	-0.166*	-0.181**	0.432***	**1.000*****	0.375***	0.053
Δnfc_t	-0.138	-0.175**	-0.124	0.245***	-0.304***	0.322***	**1.000*****	-0.428***
Δnui_t	0.316***	0.375***	0.199**	-0.619***	0.917***	0.051	-0.379***	**1.000*****

Notice that *, ** and *** indicate statistical significance at the 10%-, 5%- and 1%-level, respectively; tested two-sided.

Table 4
Price Regressions

Panel A
Unadjusted Price Regression

N = 145	IFRS			NGAAP			DIFFERENCE		
	Coef.		t-stat.	Coef.		t-stat.	ΔCoef.		t-stat.
Intercept	**16.006**	***	3.960	**18.829**	***	3.746	**-2.823**		-0.438
B	**1.156**	***	6.771	**0.905**	***	4.966	**0.248**		1.004
E	**1.392**		1.503	**2.819**	**	2.505	**-1.429**		-0.979
Adj. R^2	**0.805**	***	35.496	**0.792**	***	32.781	**0.013**		0.400
F-value	**42.140**	***		**24.744**	***		**0.46**		

Panel B
Inefficiency-Adjusted Price Regressions

N = 145	IFRS			NGAAP			DIFFERENCE		
	Coef.		t-stat.	Coef.		t-stat.	ΔCoef.		t-stat.
Intercept	**15.495**	***	3.361	**16.596**	***	4.086	**-1.101**		-0.179
B	**1.063**	***	5.784	**0.923**	***	6.394	**0.140**		0.598
E	**2.258**	***	2.996	**3.262**	***	3.357	**-1.004**		-0.817
Adj. R^2	**0.811**	***	36.877	**0.842**	***	45.613	**-0.031**		-1.086
F-value	**41.321**	***		**52.689**	***		**0.24**		
Intercept	**15.501**	***	3.845	**11.861**	***	4.105	**3.640**		0.734
B	**0.656**	*	1.965	**0.577**	***	4.424	**0.079**		0.221
NOI	**6.183**	***	3.295	**7.305**	***	6.170	**-1.123**		-0.506
NFC	**-8.950**		-1.248	**-1.115**		-0.467	**-7.835**		-1.037
NUI	**2.635**	**	2.551	**2.621**	***	3.322	**0.014**		0.011
Adj. R^2	**0.860**	***	52.034	**0.914**	***	88.841	**-0.054**	***	-2.747
F-value	**30.299**	***		**197.722**	***		**0.51**		
Intercept	**15.936**	***	3.298	**11.678**	***	4.001	**4.257**		0.754
B	**0.691**	*	1.955	**0.635**	***	4.008	**0.056**		0.145
ORE	**6.570**	***	4.014	**7.316**	***	6.145	**-0.746**		-0.368
OCO	**-6.611**	***	-4.049	**-7.342**	***	-6.179	**0.731**		0.362
NFC	**-8.840**		-1.170	**-0.395**		-0.191	**-8.445**		-1.078
NUI	**2.422**	**	2.575	**2.369**	***	2.694	**0.054**		0.042
Adj. R^2	**0.863**	***	53.120	**0.915**	***	90.038	**-0.052**	***	-2.710
F-value	**20.789**	***		**152.724**	***		**1.12**		

The standard deviations behind the t-values are White-adjusted, see White (1980). Since N ≤ 250, the standard deviations are HC3, see MacKinnon and White (1985) and Long and Erwin (2000). The t-statistic for differences between IFRS and NGAAP is based on the assumption that pairs of regression coefficients or adjusted R^2 are uncorrelated between the two reporting regimes, see Harris, Lang and Möller (1994) for an identical approach to test the significance of differences in the adjusted R^2. The standard deviation of adjusted R^2 is calculated according to Cramer (1987). When testing for joint differences in the regression coefficients, the reported F-value is the Chow test. The Vuong test based on Lien and Vuong (1987) and Vuong (1989) is postponed to Table 6 due to three pairs of observations containing different exchange rates and thereby different stock prices between the IFRS and NGAAP observations. The asterisks *, ** and *** indicate statistical significance at the 10%-, 5%- and 1%-level, respectively; tested two-sided.

Table 5
Analysis of the Marginal Contribution of IFRS Relative to NGAAP

Panel A
Complete Marginal Regressions

N = 145	ΔIFRS			NGAAP		
	Coef.		t-stat.	Coef.		t-stat.
Intercept				**15.086**	***	4.651
B_{NGAAP}				**1.059**	***	9.482
ΔB_{IFRS}	**0.730**		1.308			
E_{NGAAP}				**2.684**	***	3.454
ΔE_{IFRS}	**-1.123**		-0.795			
Δ Adj. R^2	**0.029**		1.219			
F(ΔIFRS = 0)	**2.80**	*				
Intercept				**12.261**	***	3.977
B_{NGAAP}				**1.114**	***	6.922
ΔB_{IFRS}	**0.927**		1.388			
E_{NGAAP}				**3.334**	**	2.486
ΔNOI_{IFRS}	**1.916**		0.458			
ΔNFC_{IFRS}	**17.705**	*	1.859			
ΔNUI_{IFRS}	**-3.872**		-1.501			
Δ Adj. R^2	**0.043**	*	1.859			
F(ΔIFRS = 0)	**3.26**	**				
Intercept				**12.523**	***	3.838
B_{NGAAP}				**1.112**	***	7.073
ΔB_{IFRS}	**0.821**		0.991			
E_{NGAAP}				**3.252**	**	2.510
ΔORE_{IFRS}	**4.133**		1.545			
ΔOCO_{IFRS}	**-3.882**		-1.464			
ΔNFC_{IFRS}	**12.166**		1.006			
ΔNUI_{IFRS}	**-3.631**		-1.445			
Δ Adj. R^2	**0.045**	*	1.953			
F(ΔIFRS = 0)	**2.95**	**				

Panel B
Reduced Marginal Regression – Stepwise by Forward Inclusion

N = 145	ΔIFRS			NGAAP		
	Coef.		t-stat.	Coef.		t-stat.
Intercept				**15.079**	***	4.643
B_{NGAAP}				**0.999**	***	9.041
ΔB_{IFRS}	**0.703**	***	3.291			
E_{NGAAP}				**3.008**	***	4.053
Δ Adj. R^2	**0.026**		1.074			
F(ΔIFRS = 0)	**10.83**	***				

ΔB = the restatement of equity, ΔE = the restatement of earnings, ΔNOI = the restatement of net operating income, ΔNFC = the restatement of net financial cost, ΔNUI = the restatement of net unusual income, ΔORE = the restatement of operating revenues and ΔOCO = the restatement of operating cost, including allocated operating taxes, due to the adoption of IFRS. The test statistic for the change in adjusted R^2 is standard, as the change is between the pure NGAAP regression and the expanded NGAAP regression with reconcilement adjustments to IFRS, see e.g. Green (2008, pp. 89-90) for the standard test of differences in adjusted R^2 when one regression is nested within the other. This test produces the F-value, denoted F(ΔIFRS = 0), which is also the test for whether the IFRS reconcilement coefficients are different from zero. A second test statistic is provided based on Cramer (1987). But since this test is developed for non-nested models possibly with different dependent variables, it is less powerful than the standard test. The reduced regression is found by starting with a model including only NGAAP book value and earnings. The IFRS adoption variables are added by forward inclusion if they give a significant contribution at the 10%-level or higher. Notice that *, ** and *** indicate statistical significance at the 10%-, 5%- and 1%-level, respectively; tested two-sided.

Table 6
Return Regressions

Panel A
Unadjusted Return Regression

	IFRS			NGAAP			DIFFERENCE	
N = 130	**Coef.**		**t-stat.**	**Coef.**		**t-stat.**	**ΔCoef.**	**t-stat.**
Intercept	**0.187**	***	4.432	**0.210**	***	5.255	**-0.023**	-0.403
e	**0.542**		1.295	**0.457**		1.273	**0.085**	0.154
Δe	**1.209**	***	4.779	**1.115**	***	4.531	**0.094**	0.267
Adj. R^2	**0.243**	***	3.953	**0.227**	***	3.712	**0.017**	0.564
F-value	**18.103**	***		**12.352**	***		**0.06**	

Panel B
Inefficiency-Adjusted Return Regressions

	IFRS			NGAAP			DIFFERENCE	
N = 130	**Coef.**		**t-stat.**	**Coef.**		**t-stat.**	**ΔCoef.**	**t-stat.**
Intercept	**0.121**	**	2.249	**0.149**	***	2.868	**-0.028**	-0.376
e	**0.631**		1.388	**0.534**		1.376	**0.097**	0.162
Δe	**1.522**	***	4.475	**1.422**	***	4.168	**0.100**	0.208
Adj. R^2	**0.224**	***	3.668	**0.214**	***	3.536	**0.009**	0.294
F-value	**12.359**	***		**9.459**	***		**0.05**	
Intercept	**0.117**	*	1.948	**0.167**	***	2.939	**-0.051**	-0.615
noi	**-0.019**		-0.019	**-0.659**		-0.830	**0.640**	0.507
nfc	**0.631**		0.304	**0.647**		0.375	**-0.016**	-0.006
nui	**1.133**	**	2.045	**1.685**	***	2.764	**-0.552**	-0.670
Δnoi	**2.067**	**	2.048	**1.494**	**	2.069	**0.573**	0.462
Δnfc	**-3.756**		-1.421	**-4.806**		-1.523	**1.050**	0.255
Δnui	**1.393**	***	4.353	**1.797**	***	3.359	**-0.404**	-0.603
Adj. R^2	**0.224**	***	3.505	**0.228**	***	3.575	**-0.005**	-0.126
F-value	**5.082**	***		**3.575**	***		**0.21**	
Intercept	**0.163**	**	2.575	**0.194**	***	2.894	**-0.031**	-0.336
ore	**-0.180**		-0.149	**-0.910**		-1.105	**0.729**	0.499
oco	**0.137**		0.112	**0.863**		1.046	**-0.726**	-0.493
nfc	**1.473**		0.537	**1.583**		0.661	**-0.111**	-0.030
nui	**1.100**	*	1.932	**1.445**	**	2.477	**-0.345**	-0.424
Δore	**2.388**	**	2.269	**1.776**	**	2.546	**0.612**	0.485
Δoco	**-2.199**	**	-2.063	**-1.505**	**	-2.146	**-0.694**	-0.544
Δnfc	**-4.565**		-1.405	**-4.420**		-1.171	**-0.145**	-0.029
Δnui	**1.268**	***	3.296	**1.572**	***	3.254	**-0.303**	-0.491
Adj. R^2	**0.251**	***	3.847	**0.249**	***	3.823	**0.002**	0.035
F-value	**4.291**	***		**3.800**	***		**0.15**	

The test statistic of the difference in adjusted R^2 is based on Lien and Vuong (1987) and Vuong (1989) as the two regressions are non-nested with a common dependent variable. The test statistic of the adjusted R^2 in each individual regression is based on Cramer (1987). The F-value for the overall difference in the coefficient structure is the Chow test. *, ** and *** indicate statistical significance at the 10%-, 5%- and 1%-level, respectively; tested two-sided.

Table 7
Analysis of the Marginal Contribution of IFRS Relative to NGAAP

Panel A
Complete Marginal Regressions

N = 130	ΔIFRS			NGAAP		
	Coef.		t-stat.	Coef.		t-stat.
Intercept				**0.127**	**	2.300
e_{NGAAP}				**0.625**		1.393
Δe_{NGAAP}				**1.541**	***	4.517
$\Delta\Delta e_{IFRS}$	**0.983**		1.175			
Δ Adj. R^2_{IFRS}	**0.008**		0.377			
F(ΔIFRS = 0)	**1.38**					
Intercept				**0.115**	**	2.157
e_{NGAAP}				**0.626**		1.365
Δe_{NGAAP}				**1.735**	***	4.587
$\Delta\Delta noi_{IFRS}$	**2.344**	**	2.289			
$\Delta\Delta nfc_{IFRS}$	**1.499**		0.284			
$\Delta\Delta nui_{IFRS}$	**-1.552**		-1.396			
Δ Adj. R^2_{IFRS}	**0.055**		1.503			
F(ΔIFRS = 0)	**2.80**	**				
Intercept				**0.135**	**	2.489
e_{NGAAP}				**0.645**		1.359
Δe_{NGAAP}				**1.756**	***	4.503
$\Delta\Delta ore_{IFRS}$	**2.474**	**	2.518			
$\Delta\Delta oco_{IFRS}$	**-2.276**	**	-2.364			
$\Delta\Delta nfc_{IFRS}$	**-1.609**		-0.232			
$\Delta\Delta nui_{IFRS}$	**-2.073**	*	-1.693			
Δ Adj. R^2_{IFRS}	**0.064**		1.460			
F(ΔIFRS = 0)	**2.55**	**				

Panel B
Reduced Marginal Regression – Stepwise with Forward Inclusion

N = 130	ΔIFRS			NGAAP		
	Coef.		t-stat.	Coef.		t-stat.
Intercept				**0.106**	**	2.046
e_{NGAAP}				**0.680**		1.476
Δe_{NGAAP}				**1.732**	***	4.714
$\Delta\Delta noi_{IFRS}$	**2.410**	**	2.268			
Δ Adj. R^2_{IFRS}	**0.053**		1.563			
F(ΔIFRS = 0)	**5.14**	**				

The test statistic for the change in adjusted R^2 is standard, as the change is between the pure NGAAP regression and the expanded NGAAP regression with reconcilement adjustments to IFRS, see e.g. Green (2008, pp. 89-90) for the standard test of differences in adjusted R^2 when one regression is nested within the other. This test produces the F-value, denoted F(ΔIFRS = 0), which is also the test for whether the IFRS reconcilement coefficients are different from zero. A second test statistic is provided based on Lien and Vuong (1987) and Vuong (1989). But since this test is developed for non-nested models with a common dependent variable, it is less powerful than the standard test. Notice that *, ** and *** indicate statistical significance at the 10%-, 5%- and 1%-level, respectively; tested two-sided.

Table 8
Abnormal Return Regressions

Panel A
Inefficiency-Adjusted Abnormal Return Regression

N = 130	IFRS			NGAAP			DIFFERENCE	
	Coef.		**t-stat.**	**Coef.**		**t-stat.**	**ΔCoef.**	**t-stat.**
Intercept	**-0.045**		-0.956	**-0.029**		-0.655	**-0.015**	-0.240
Δe	**1.203**	***	3.133	**1.222**	***	3.349	**-0.019**	-0.036
Adj. R^2	**0.157**	***	2.801	**0.165**	***	2.912	**-0.008**	-0.510
F-value	**9.814**	***		**11.213**	***		**0.03**	

Panel B
Unadjusted Abnormal Return Regressions

N = 130	IFRS			NGAAP			DIFFERENCE	
	Coef.		**t-stat.**	**Coef.**		**t-stat.**	**ΔCoef.**	**t-stat.**
Intercept	**-0.106**	***	-2.884	**-0.093**	**	-2.611	**-0.013**	-0.261
Δe	**0.940**	***	5.240	**0.939**	***	5.365	**0.002**	0.006
Adj. R^2	**0.220**	***	3.657	**0.223**	***	3.705	**-0.003**	-0.193
F-value	**27.457**	***		**28.787**	***		**0.04**	
Intercept	**-0.120**	***	-3.142	**-0.095**	**	-2.596	**-0.025**	-0.481
Δnoi	**1.679**	**	2.485	**1.110**	**	2.013	**0.569**	0.652
Δnfc	**-3.024**	*	-1.818	**-1.963**		-0.975	**-1.061**	-0.406
Δnui	**0.668**	**	2.054	**0.832**	**	2.358	**-0.164**	-0.342
Adj. R^2	**0.237**	***	3.817	**0.214**	***	3.482	**0.023**	0.627
F-value	**7.304**	***		**7.791**	***		**0.13**	
Intercept	**-0.120**	***	-3.123	**-0.089**	**	-2.156	**-0.031**	-0.545
Δore	**1.670**	**	2.396	**1.074**	*	1.920	**0.596**	0.667
Δoco	**-1.679**	**	-2.342	**-1.117**	*	-1.878	**-0.563**	-0.604
Δnfc	**-3.013**	*	-1.674	**-2.083**		-0.997	**-0.930**	-0.337
Δnui	**0.673**	**	2.014	**0.845**	**	2.312	**-0.172**	-0.347
Adj. R^2	**0.231**	***	3.690	**0.210**	***	3.388	**0.021**	0.548
F-value	**5.341**	***		**5.863**	***		**0.13**	

The test statistic of the difference in adjusted R^2 is based on Lien and Vuong (1987) and Vuong (1989) as the two regressions are non-nested with a common dependent variable. The test statistic of the adjusted R^2 in each individual regression is based on Cramer (1987). The F-value for the overall difference in the coefficient structure is the Chow test. The asterisks *, ** and *** indicate statistical significance at the 10%-, 5%- and 1%-level, respectively; tested two-sided.

Table 9
Analysis of the Marginal Contribution of IFRS Relative to NGAAP

Panel A
Complete Marginal Regression

N = 130	ΔIFRS			NGAAP		
	Coef.		t-stat.	Coef.		t-stat.
Intercept				**-0.101**	***	-2.621
Δe_{NGAAP}				**0.963**	***	5.347
$\Delta\Delta e_{IFRS}$	**0.415**		0.865			
Δ Adj. R^2_{IFRS}	**-0.002**		-0.180			
F(ΔIFRS = 0)	**0.75**					
Intercept				**-0.114**	***	-3.130
Δe_{NGAAP}				**1.072**	***	4.985
$\Delta\Delta noi_{IFRS}$	**1.257**	**	2.159			
$\Delta\Delta nfc_{IFRS}$	**-2.831**		-0.673			
$\Delta\Delta nui_{IFRS}$	**-1.121**		-1.084			
Δ Adj. R^2_{IFRS}	**0.026**		0.904			
F(ΔIFRS = 0)	**2.03**					
Intercept				**-0.096**	***	-2.451
Δe_{NGAAP}				**1.079**	***	5.058
$\Delta\Delta ore_{IFRS}$	**1.354**	**	2.506			
$\Delta\Delta oco_{IFRS}$	**-1.188**	**	-2.299			
$\Delta\Delta nfc_{IFRS}$	**-5.465**		-0.884			
$\Delta\Delta nui_{IFRS}$	**-1.575**		-1.450			
Δ Adj. R^2_{IFRS}	**0.037**		0.905			
F(ΔIFRS = 0)	**1.98**					

Panel B
Reduced Marginal Regression – Stepwise with Forward Inclusion

N = 130	ΔIFRS			NGAAP		
	Coef.		t-stat.	Coef.		t-stat.
Intercept				**-0.112**	***	-3.164
Δe_{NGAAP}				**1.050**	***	5.074
$\Delta\Delta noi_{IFRS}$	**1.265**	**	2.059			
Δ Adj. R^2_{IFRS}	**0.021**		1.262			
F(ΔIFRS = 0)	**4.24**	**				

The test statistic for the change in adjusted R^2 is standard, as the change is between the pure NGAAP regression and the expanded NGAAP regression with reconcilement adjustments to IFRS, see e.g. Green (2008, pp. 89-90) for the standard test of differences in adjusted R^2 when one regression is nested within the other. This test produces the F-value, denoted F(ΔIFRS = 0), which is also the test for whether the IFRS reconcilement coefficients are different from zero. A second test statistic is provided based on Lien and Vuong (1987) and Vuong (1989). But since this test is developed for non-nested models with a common dependent variable, it is less powerful than the standard test. Notice that *, ** and *** indicate statistical significance at the 10%-, 5%- and 1%-level, respectively; tested two-sided.

Table 10
Inefficiency-Adjusted Abnormal Return Regressions – Robustness for Extreme Observations

Panel A
Removal of 1% Highest and 1% Lowest of All Dfbetas Conditioned on Matched Pairs

N = 124	IFRS			NGAAP			DIFFERENCE		
	Coef.		t-stat.	Coef.		t-stat.	ΔCoef.		t-stat.
Intercept	**-0.125**	***	-4.424	**-0.089**	***	-2.899	**-0.036**		-0.873
Δnoi	**2.054**	***	4.137	**1.157**	**	2.125	**0.897**		1.237
Δnfc	**-3.660**	***	-2.814	**-3.060**		-1.519	**-0.600**		-0.250
Δnui	**0.960**	***	3.403	**1.086**	**	2.613	**-0.126**		-0.251
Adj. R^2	**0.425**	***	7.091	**0.357**	***	5.672	**0.069**		1.543
F-value	**12.121**	***		**26.684**	***		**0.57**		
Intercept				**-0.111**	***	-3.797			
Δe_{NGAAP}				**1.481**	***	7.714			
$\Delta\Delta noi_{IFRS}$							**2.088**	***	3.000
$\Delta\Delta nfc_{IFRS}$							**1.797**		0.663
$\Delta\Delta nui_{IFRS}$							**-0.604**		-0.809
Δ Adj. R^2_{IFRS}							**0.081**	**	2.216
F(ΔIFRS = 0)							**3.49**	**	

Panel B
Removal of the 5% Observations with the Highest Cook's D Conditioned on Matched Pairs

N = 122	IFRS			NGAAP			DIFFERENCE		
	Coef.		t-stat.	Coef.		t-stat.	ΔCoef.		t-stat.
Intercept	**-0.120**	***	-4.155	**-0.092**	***	-3.205	**-0.028**		-0.692
Δnoi	**1.699**	***	2.815	**0.887**	**	2.003	**0.882**		1.085
Δnfc	**-3.929**	**	-2.473	**-4.177**	**	-2.155	**0.248**		0.099
Δnui	**0.756**	***	3.030	**0.740**	***	3.118	**0.017**		0.048
Adj. R^2	**0.300**	***	4.642	**0.258**	***	4.001	**0.042**		1.025
F-value	**7.683**	***		**14.670**	***		**0.47**		
Intercept				**-0.105**	***	-3.644			
Δe_{NGAAP}				**1.279**	***	7.402			
$\Delta\Delta noi_{IFRS}$							**1.833**	**	2.531
$\Delta\Delta nfc_{IFRS}$							**2.894**		1.361
$\Delta\Delta nui_{IFRS}$							**-0.494**		-0.749
Δ Adj. R^2_{IFRS}							**0.075**	**	2.001
F(ΔIFRS = 0)							**2.87**	**	

Dfbeta is a measure of each observation's influence on the coefficient estimates, variable for variable. Cook's D is a measure of each observation's overall influence on the regression. The t-values are based on HC3 standard deviations, cf. Table 4. *, ** and *** indicate statistical significance at the 10%-, 5%- and 1%-level, respectively; tested two-sided.

Table 11
Abnormal Return Regressions –
Weighted by Intangible Assets

Panel A
WLS by the Intangible-to-Total Asset Ratio

N = 130	IFRS			NGAAP			DIFFERENCE		
	Coef.		t-stat.	Coef.		t-stat.	ΔCoef.		t-stat.
Intercept	**-0.093**	**	-2.445	**-0.094**	**	-2.199	**0.001**		0.024
Δnoi	**2.180**	***	3.142	**2.127**	***	2.845	**0.054**		0.053
Δnfc	**-1.856**		-0.685	**-2.547**		-0.923	**0.691**		0.179
Δnui	**1.505**	***	5.324	**1.516**	***	4.951	**-0.011**		-0.026
Adj. R^2	**0.463**	***	8.211	**0.448**	***	7.806	**0.016**		0.697
F-value	**13.339**	***		**17.610**	***		**0.08**		
Intercept				**-0.088**	*	-1.935			
Δe_{NGAAP}				**1.761**	***	5.513			
$\Delta\Delta noi_{IFRS}$							**6.087**	***	3.044
$\Delta\Delta nfc_{IFRS}$							**3.033**		0.628
$\Delta\Delta nui_{IFRS}$							**0.378**		0.359
Δ Adj. R^2_{IFRS}							**0.050**		0.891
F(ΔIFRS = 0)							**4.31**	***	

Panel B
WLS by 1 - the Intangible-to-Total Asset Ratio

N = 130	IFRS			NGAAP			DIFFERENCE		
	Coef.		t-stat.	Coef.		t-stat.	ΔCoef.		t-stat.
Intercept	**-0.040**		-0.648	**-0.034**		-0.757	**-0.006**		-0.078
Δnoi	**0.373**		0.239	**0.111**		0.105	**0.262**		0.139
Δnfc	**-2.256**		-0.828	**-0.419**		-0.130	**-1.837**		-0.436
Δnui	**1.295**		1.542	**1.640**	*	1.766	**-0.345**		-0.276
Adj. R^2	**0.138**	**	2.437	**0.169**	***	2.859	**-0.031**		-1.206
F-value	**3.366**	**		**3.972**	***		**0.06**		
Intercept				**-0.052**		-1.123			
Δe_{NGAAP}				**1.384**	***	2.728			
$\Delta\Delta noi_{IFRS}$							**1.522**	*	1.819
$\Delta\Delta nfc_{IFRS}$							**-2.901**		-0.428
$\Delta\Delta nui_{IFRS}$							**-2.217**		-1.195
Δ Adj. R^2_{IFRS}							**0.021**		0.598
F(ΔIFRS = 0)							**1.56**		

Panel C
Differences between the Marginal Regression of Panel A and B

N = 130	DIFFERENCE		
	ΔΔCoef.		t-stat.
$\Delta\Delta noi_{IFRS}$	**4.565**	**	2.106
$\Delta\Delta nfc_{IFRS}$	**5.935**		0.713
$\Delta\Delta nui_{IFRS}$	**2.596**		1.216
Δ Adj. R^2_{IFRS}	**0.028**		0.423

The asterisks *, ** and *** indicate statistical significance at the 10%-, 5%- and 1%-level, respectively; tested two-sided.

Table 12
Abnormal Return Regressions –
Weighted by Profitability

Panel A
WLS by the Rank of the Return on Equity

N = 130	IFRS			NGAAP			DIFFERENCE		
	Coef.		t-stat.	Coef.		t-stat.	ΔCoef.		t-stat.
Intercept	**-0.057**		-1.288	**-0.049**		-1.112	**-0.008**		-0.123
Δnoi	**1.704**	**	2.509	**1.542**	**	2.538	**0.162**		0.178
Δnfc	**-2.430**		-0.847	**-2.055**		-0.553	**-0.376**		-0.080
Δnui	**0.484**		1.187	**0.599**		1.137	**-0.115**		-0.172
Adj. R^2	**0.247**	***	3.953	**0.195**	***	3.221	**0.052**	***	2.633
F-value	**2.324**	*		**2.460**	*		**0.02**		
Intercept				**-0.048**		-1.147			
Δe_{NGAAP}				**0.852**	**	2.398			
$\Delta\Delta noi_{IFRS}$							**1.618**		0.992
$\Delta\Delta nfc_{IFRS}$							**-8.185**		-1.112
$\Delta\Delta nui_{IFRS}$							**-0.515**		-0.416
Δ Adj. R^2_{IFRS}							**0.020**		0.867
F(ΔIFRS = 0)							**0.67**		

Panel B
WLS by the Rank of -ROE

N = 130	IFRS			NGAAP			DIFFERENCE		
	Coef.		t-stat.	Coef.		t-stat.	ΔCoef.		t-stat.
Intercept	**-0.041**		-0.541	**-0.049**		-0.923	**0.008**		0.085
Δnoi	**-0.362**		-0.170	**-0.526**		-0.469	**0.164**		0.068
Δnfc	**0.314**		0.071	**3.809**		0.744	**-3.494**		-0.518
Δnui	**2.151**	*	1.728	**2.773**	*	1.968	**-0.623**		-0.331
Adj. R^2	**0.211**	***	3.425	**0.283**	***	4.516	**-0.072**	*	-1.696
F-value	**3.339**	**		**4.172**	***		**0.13**		
Intercept				**-0.040**		-0.616			
Δe_{NGAAP}				**2.141**	***	2.713			
$\Delta\Delta noi_{IFRS}$							**2.278**	**	2.412
$\Delta\Delta nfc_{IFRS}$							**0.699**		0.085
$\Delta\Delta nui_{IFRS}$							**-4.135**	*	-1.765
Δ Adj. R^2_{IFRS}							**0.060**		0.828
F(ΔIFRS = 0)							**2.55**	*	

Panel C
Differences between the Marginal Regression of Panel A and B

N = 130	DIFFERENCE		
	ΔΔCoef.		t-stat.
$\Delta\Delta noi_{IFRS}$	**-0.660**		-0.350
$\Delta\Delta nfc_{IFRS}$	**-8.884**		-0.806
$\Delta\Delta nui_{IFRS}$	**3.619**		1.366
Δ Adj. R^2_{IFRS}	**-0.040**		-0.526

Notice that *, ** and *** indicate statistical significance at the 10%-, 5%- and 1%-level, respectively; tested two-sided.