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Earnings sustainability, economic conditions and the value relevance of accounting information

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Financial statement information;
Intangible assets;
Investment level;
Growth expectations

Summary This study demonstrates that the value relevance of accounting information is influenced by the ability to capitalize investments in valuable resources. We use data from Sweden to show that firms that operate in industries in which accounting conservatism limits this capitalization display lower value relevance as a result of more unsustainable earnings components. However, when controlling for the different properties of sustainable and unsustainable earnings components, the difference vanishes. Moreover, we show that firms operating in industries in which more investments are immediately expensed display systematic temporal variations in the level of value relevance. We contend that economic conditions in the form of investment levels and growth expectations explain this variation. Thus, value relevance can be substantially affected by the prevailing economic context.

Introduction

Accounting information plays an important role when shareholders evaluate a firm's prospects in forming their investment decisions. In accounting research, statistical associations between accounting information and share prices are used to assess the degree of value relevance of accounting information for shareholders (Collins, Maydew, & Weiss, 1997; Gjerde, Knivsflå, & Sættem, 2011; Thinggaard & Damkier, 2008). Although a few studies report that the level of value relevance changes in the long term (Collins et al., 1997; Francis & Schipper, 1999), there is little documentation of short-term variations in measures of value relevance. Temporal variations in value relevance are a matter of research interest because value relevance measures are often used to compare time periods and accounting regimes. Such comparisons rely on the assumption that measures of value relevance are solely determined by the accounting system. We use a sample of Swedish firms to challenge this important assumption and investigate how value relevance is associated with earnings sustainability and general economic conditions.

The analysis departs from two realities: (i) an immediately expensed investment decreases current earnings but increases future earnings, and (ii) the unconditional form of accounting conservatism inhibits firms from capitalizing their investments in many valuable resources (e.g., research and human capital). We argue that because the level of investment varies over time, firms that invest heavily in resources that cannot be capitalized as assets display larger temporal variations in their reported earnings. The consequence is that the unconditional form of accounting conservatism has more severe effects on value relevance measures

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when a firm expenses more of its investments. The variation in the effect of a conservative accounting system over time is not an unknown feature (Givoly & Hayn, 2000), but its effects on measures of value relevance have attracted little attention in prior research.

In the empirical analysis, we follow the procedures of researchers such as Francis and Schipper (1999) and partition the sample to study differences in value relevance between firms that are likely to capitalize a large portion of their investments in valuable resources (referred to as *traditional industries*) and firms that must expense most of their investments in valuable resources (referred to as *non-traditional industries*). The initial empirical tests suggest that firms operating in traditional industries, such as manufacturing firms, report more value-relevant information than firms in non-traditional industries, such as consulting and biotechnology firms.

To better understand these differences in value relevance, we begin by analyzing reported earnings and their components. To be value-relevant, reported earnings must represent a level of earnings that can be sustained in the future (Beaver, Lambert, & Morse, 1980). We develop three models that separate sustainable from unsustainable earnings components. Throughout the study, we regard sustainable earnings as earnings components that are expected to prevail over a multi-period future, and we consider unsustainable earnings to be transitory, single-period earnings components. The empirical tests show that the separation of sustainable and unsustainable earnings components increases the measure of value relevance. However, value relevance increases considerably more for firms in non-traditional industries. Indeed, the difference in value relevance between the two groups disappears completely when sustainable and unsustainable earnings components are separated.

Our results suggest that firms operating in non-traditional industries have more unsustainable earnings components in their reported earnings. Although the separation of sustainable and unsustainable earnings components is based on mechanical techniques rather than, for example, a firm's own disclosure of unsustainable earnings components, we believe that the larger unsustainable earnings components in non-traditional industries can be attributed to their many investments in valuable resources that cannot be capitalized. We contend that a comparison of the value relevance between two samples is complicated if the ability of reported earnings to capture sustainable earnings differs between the two samples.

Next, we analyze whether economic conditions affect measures of value relevance. We suggest that the growth in GDP per capita proxies for the firm's level of investment, and that the stock market's average book-to-market ratio proxies for the market's growth expectations. We document the systematic temporal variations in value relevance for non-traditional industries and find that these variations are significantly associated with the level of investment and growth expectations. However, firms operating in traditional industries do not experience these variations. We suggest two explanations. First, an immediate expensing of valuable investments renders accounting earnings similar to cash flows, and when the level of investment is high, current earnings are particularly unrepresentative of future earnings. Thus, high investment levels reduce the value relevance of accounting information for firms with non-recognizable resources. When the level of investment is low, the reported earnings contain fewer unsustainable elements; thus, the value relevance increases. Second, firms that rely on unrecognized resources are more difficult to understand, and this difficulty reduces an investor's ability to determine their future cash flows and value. We suggest that the difficulty of understanding a firm's resource base plays a greater role when the expected growth rate is high than when it is low.

Although the two proxies we use are somewhat crude measures of the investment level and growth expectations, the analysis clearly shows that exogenous factors influence the relationship between accounting information and value when investments are immediately expensed. Our results suggest that researchers must be cautious to avoid mistakenly attributing differences in value relevance to differences in accounting because the real cause can be the research design. We suggest two areas in which caution is required. First, biases are more likely to occur in comparisons between samples in which the proportion of unsustainable earnings elements differ. In these situations, simple adjustments for unsustainable earnings will provide a more reliable testing environment. Second, biases are more likely to occur in comparisons between samples containing differences in the level of investment and growth expectation. In particular, these biases can occur when the analyzed time periods are short. These analyses may include comparisons of the value relevance before and after the adoption of a new accounting standard. Indeed, when the firms in these samples have a greater reliance on resources that must be immediately expensed, more biases may be present in the analysis.

The remainder of the paper is organized as follows. "Research hypotheses" discusses prior research and develops the hypotheses to be tested. "Measuring value relevance" outlines our research methodology and data sample. "Test results and analysis" presents the results of the empirical analysis, and "Conclusions" concludes the analysis.

Research hypotheses

The longitudinal development of value relevance has been subject to extensive research. Several studies based on US data suggest that accounting earnings have become less relevant over time (Francis & Schipper, 1999; Lev & Zarowin, 1999). These findings are not confirmed in the Scandinavian setting. Thinggaard and Damkier (2008) do not find that the level of value relevance decreased in Denmark during the time period from 1983 to 2002, whereas Gjerde et al. (2011) actually find that the value relevance in Norway *increased* from 1965 to 2004. To the best of our knowledge, there is no similar longitudinal study that uses Swedish data.

A large number of studies have demonstrated the important role of accounting information in capital markets (Kothari, 2001). Longitudinal studies of value relevance illustrate that this role is dependent on developments that are exogenous to accounting regulations, such as changes in company size and industry composition (Collins et al., 1997). Nonetheless, the main focus of most longitudinal studies is on accounting systems and regulations (e.g., Barth, Landsman, & Lang, 2008). One of the most basic features of an accounting system is that investments are capitalized as assets when certain recognition criteria are fulfilled. However, although the criteria have remained similar for

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decades, the proportions of firms undertaking investments that do not meet these criteria have increased over time (Francis & Schipper, 1999; Gjerde et al., 2011). Increasingly, firms undertake greater investments in non-recognizable resources, such as research and human capital (Lev & Zarowin, 1999). Consequently, the strict recognition criteria increase market-to-book ratios. Moreover, because the lack of capitalization of valuable investments distorts the measurement of accounting earnings, the increasing investments in non-recognizable assets cause growing proportions of unsustainable earnings components.

An often cited reason for the decrease in the value relevance of US accounting information is the increase in the frequency of negative earnings (Collins et al., 1997; Klein & Marquardt, 2006). In general, negative earnings are not informative in the same manner as positive earnings because shareholders have an abandonment option; hence, losses are not expected to be sustained (Hayn, 1995). Several studies of value relevance support this notion. For example, Collins et al. (1997) find that value relevance is lower in periods in which a higher proportion of firms report losses. Similarly, adjustments to the different properties of positive and negative earnings increase the association between accounting information and share prices (e.g., Francis, Schipper, & Vincent, 2003).

Even for studies of value relevance that adjust for losses, losses are simply a special form of unsustainable earnings. An increased frequency of negative earnings can stem from an increased dispersion in accounting figures (Givoly & Hayn, 2000) and a higher frequency of non-normal items (Johnson, Lopez, & Sanchez, 2011). In a conservative accounting system, *negative* non-normal items are larger and more apparent (Klein & Marquardt, 2006). However, the adjustments for negative earnings in many previous studies of value relevance do not apply to all unsustainable earnings because positive earnings contain both positive and negative unsustainable components.

Rather than focusing on the sign of earnings, some research studies have investigated the different effects of sustainable (permanent) and unsustainable (transitory) earnings components on stock prices (e.g., Beaver et al., 1980; Collins, Kothari, Shanken, & Sloan, 1994; Penman & Zhang, 2002; Ramakrishnan & Thomas, 1998). These authors show that an adjustment for the different properties of the earnings components improves the relationship between accounting information and share prices (i.e., value relevance). This finding is attributable to the fact that unsustainable components disappear as earnings revert to their sustainable level (Ramakrishnan & Thomas, 1998). Although the mean reversion process in earnings is well documented in the literature (Beaver, 1970), it is often neglected in value relevance research.

In this study, we propose that the immediate expensing of investments in valuable resources causes significant firm differences in the proportion of unsustainable earnings components. These differences affect the measurement of value relevance. Specifically, the immediate expensing of investments reduces the ability of balance sheets to measure the intrinsic asset values of firms and introduces unsustainable elements in reported earnings. A growth in unrecognized investments reduces contemporary earnings and creates "hidden reserves" (Penman & Zhang, 2002). Similarly, a reduction in the level of investment releases these reserves and increases contemporary earnings. Larger effects are observed for firms with more non-capitalized resources. Consequently, firms that immediately expense more of their investments will have less value-relevant reported earnings. However, measures of value relevance improve when reported earnings are decomposed into sustainable and unsustainable earnings (Ramakrishnan & Thomas, 1998). Thus, firms with large levels of investments in resources that cannot be capitalized as assets are likely to benefit the most from the identification of unsustainable earnings components as a result of the non-capitalization of assets. Therefore, we propose the following hypothesis (stated as an alternative to its null):

H1. Firms that are dependent on non-capitalized resources exhibit a comparatively larger increase in value relevance when sustainable earnings components are separated from unsustainable earnings components.

A number of studies report that the value relevance of accounting information is not constant over time (Collins et al., 1997; Gjerde et al., 2011). These longitudinal studies of value relevance observe long-term trends rather than temporal variations. However, other studies have shown that the value relevance of accounting information may be sensitive to variations in economic conditions. For instance, it is suggested that value relevance is affected by crises (Davis-Friday & Gordon, 2005), and is generally influenced by the financial health of firms (Barth, Beaver, & Landsman, 1998). We suspect that the ability to capitalize investments in valuable resources and expense them in a timely manner results in systematic temporal variations in value relevance as a function of the prevailing economic conditions. We propose two reasons for this variation.

First, differences in the level of sustainable earnings may cause different sensitivities to economic conditions. As previously discussed, immediately expensed investments introduce unsustainable "noise" to reported earnings (Ramakrishnan & Thomas, 1998). A manufacturing firm's investment in production facilities is capitalized and written off over an expected useful life, whereas an equally important investment for a consulting or biotech firm is immediately expensed. Thus, fewer long-term accruals for firms that are more dependent on non-capitalized resources increase the noisiness of contemporary reported earnings (cf. Dechow, 1994, shows that earnings have a higher association with stock prices than cash flows), and we expect the noise level to vary in relation to a firm's level of investment (Penman & Zhang, 2002). When the level of immediately expensed investments is high, reported earnings differ considerably from sustainable earnings, and the value relevance is therefore low. In contrast, when firms capitalize most of their investments, the unsustainable component is smaller, and value relevance is consequently higher.

H2a. The value relevance of the accounting information that is provided by firms that are dependent on non-capitalized resources is negatively associated with the level of investment.

Second, differences in non-information-based stock trading may affect the relation between value relevance and economic conditions. Dontoh, Radhakrishnan, and Ronen (2004) suggest that non-information-based trading leads to share price volatility and document the negative effect of

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such volatility on the value relevance of accounting information (see also Francis & Schipper, 1999). There are reasons to believe that there is more non-information-based trading among firms that expense most of their investments immediately: when important resources are omitted from the balance sheet, investors simply have less information on which to base their decisions when they are determining company value. A greater portion of a firm's market value of equity is dependent on uncertain future earnings rather than on verified values of current resources. Ceteris paribus, increased uncertainty generates more changes in investor expectations and thus in share prices. Collectively, the findings of Dontoh et al. (2004) are consistent with a higher frequency of non-information-based trading activities for firms that rely heavily on intangible resources.

Shleifer and Summers (1990) suggest that the level of non-information-based trading, or noise trading, is more common when there are strong market sentiments and high growth expectations. Similarly, Linnainmaa (2005) shows that day traders are more active when growth expectations are high. As a consequence, we expect that the relative value relevance of firms that expense their investments immediately is negatively associated with growth expectations. When market sentiments are positive and expected future growth rates are high, investors are more likely to undertake noise-based investments, which have a negative effect on value relevance, and the effect is particularly strong for companies with more non-capitalized assets.

H2b. The value relevance of the accounting information that is provided by firms that are dependent on non-capitalized resources is negatively associated with growth expectations.

Measuring value relevance

Research design

Value relevance is defined as the ability of financial statement information to explain share prices across a sample of firms. Following an extensive tradition in accounting research, we measure value relevance using multiple regressions in which a firm's share price is explained using summary accounting measures of its performance and financial position.[1] This model's adjusted R^2 is the primary measure of value relevance. A high adjusted R^2 value indicates that within a sample of firms, accounting information is well reflected in the share price. Consistent with this research tradition (e.g., Collins et al., 1997; Dontoh et al., 2004), we use the standard price model specification as our starting point:

$$\text{Model (1)} \qquad P_{it} = a_0 + a_1 BV_{it} + a_2 E_{it} + \varepsilon_{it}$$

where P_{it} is the share price measured in April of year $t+1$, BV_{it} is the book value of equity per share for year t, and E_{it} is the net earnings per share for year t. Some rather well-known statistical problems are related to this model specification.[2] In particular, scale effects can increase the value of R^2, and this effect increases with the coefficient of variation of the scale factor. Comparisons between samples based on R^2 may be less valid if the coefficient of variation of the scale factor differs between samples. To err on the side of caution, we follow the advice of Gu (2007) and test how the use of a scale-adjusted root-mean-square error (RMSE) affects our results.

The value relevance of accounting information is expected to increase if one accounts for the different properties of sustainable and unsustainable earnings. To enrich our understanding of sustainable earnings, we establish three alternative model specifications and compare their ability to explain share prices. Previous research suggests a difference between positive and negative earnings (Hayn, 1995), and adjustments for losses are relatively common in studies of value relevance (Core, Guay, & Van Buskirk, 2003; Dontoh et al., 2004). Therefore, in the first of these models, Model (2), we control for negative earnings using a dummy variable (*DNEG*) that is set to one when $E < 0$ and is zero otherwise. The logic behind Model (2) is that negative earnings arise from transitory events that have large negative effects on a firm's reported performance. An adjustment for this unsustainable negative earnings component is expected to improve the overall ability of accounting information to explain share prices. We transform Model (1) into the following equation:

$$\text{Model (2)} \qquad P_{it} = b_0 + b_1 BV_{it} + b_2 E_{it} + b_3 DNEG_{it} \times E_{it} + \varepsilon_{it}$$

Our second alternative model, Model (3), accounts for the fact that firms reporting positive earnings are also affected by temporary events that are observable by investors. All unsustainable earnings (i.e., both positive and negative) are expected to have a different relationship with share prices than that of sustainable earnings (Ramakrishnan & Thomas, 1998). We use firm-level data to construct a simple and robust measure of sustainable earnings (hereafter, *SE*). First, we compute the average earnings-to-assets ratio for the past five years (minimum of three years if no more data are available). Second, we multiply the average earnings-to-assets ratio with the beginning-of-period total assets to get our sustainable earnings estimate. We apply total assets rather than book equity as the scale factor in order to minimize the effect of a change in the firms' financing. This approach relies on information (i.e., net earnings [*E*] and total assets [*TA*]) that can be easily obtained from any firm. Mathematically, sustainable earnings can be expressed as:

$$SE_{i,t} = TA_{i,t-1} \cdot \left(\frac{\sum_{\tau=t-4}^{t} (E_{i,\tau}/TA_{i,\tau-1})}{5} \right)$$

[1] Our study considers that some resources are recognized in balance sheets, whereas other resources are not. Accordingly, the price-model specification is more appropriate than the return-model specification. Although the earnings and book value likely have information in common, each measure may also contain information that the other does not. For instance, in periods in which earnings contain more unsustainable elements, values are more likely to be anchored on book values.

[2] Share prices are measured in April (see, e.g., Collins et al., 1997) to reduce hindsight bias while retaining a good match between accounting and capital market data.

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We refer to the difference between reported and sustainable earnings as unsustainable earnings (*UE*). The unsustainable component is not removed but is separated to account for a different linear association with share price. As noted by Ohlson (1999), *UE* are by definition unrelated to future earnings. Thus, we expect the *UE* coefficient to be smaller than the *SE* coefficient. If the identification process of unsustainable earnings is incorrect, then there is no difference between coefficients c_2 and c_3. In our second alternative model, Model (3), *E* is decomposed into *SE* and *UE*:

$$\text{Model (3)} \qquad P_{it} = c_0 + c_1 BV_{it} + c_2 SE_{it} + c_3 UE_{it} + \varepsilon_{it}$$

Models (2) and (3) capture different aspects of the same phenomenon, but they differ from one another. Model (2) fails to identify negative unsustainable earnings that are smaller than returns from sustainable operations and fails to identify positive unsustainable earnings. Similarly, Model (3) fails to identify negative earnings that continue over a long period of time. For example, biotech firms sometimes accrue losses for more than a decade because they expense large investments in research and because launching a product requires a significant amount of time. Because the two models are expected to capture different aspects of unsustainable earnings, Model (4) is a combination of Models (2) and (3):

$$\text{Model (4)} \qquad P_{it} = d_0 + d_1 BV_{it} + d_2 SE_{it} + d_3 UE_{it} + d_4 DNEG_{it} \times E_{it} + \varepsilon_{it}$$

Data, sample selection and descriptive statistics

The sample comprises non-financial firms that were quoted on the Stockholm Stock Exchange between 1983 and 2004. Because an adoption of International Financial Reporting Standards (IFRS) is known to affect value relevance metrics (e.g., Barth et al., 2008), we follow Gjerde et al. (2011) and Thinggaard and Damkier (2008) by analyzing only the years prior to the mandatory IFRS adoption in 2005. Accounting and capital market data are obtained from the Six Trust database. The initial sample contains 6006 firm-year observations from which we eliminate financial institutions as well as real estate and investment companies (1443 observations). We eliminate observations for which there are insufficient historical data to compute measures of sustainable earnings (670 observations). After we omit the highest and lowest percentiles for the stock price, book value per share and earnings per share (161 observations), the sample comprises 3732 observations, with between 109 and 195 annual observations.

Accounting systems throughout the world differ in the extent to which intangibles can be capitalized as assets, but there is little doubt that investments in tangible resources are capitalized to a greater extent than investments in intangible resources. In Sweden, as in other countries, accounting standards limit the ability of firms to capitalize their investments as assets. Accordingly, investments in property, plant and equipment (PPE) are capitalized and expensed during their useful lives, but nearly all investments in intangible resources (e.g., human capital and internally developed brands) are immediately expensed.[3] Acquired intangibles (e.g., goodwill) are capitalized, but they are typically amortized using short useful lives.

With the exception of some research and development (R&D) expenditures, the values of immediately expensed investments in intangible resources are rarely disclosed separately. For example, a consulting firm does not disclose the amount that it spends on employee training. Rather, these immediately expensed investments are bundled together with all other expenses. Accounting standards allow firms to capitalize development expenses that meet certain strict criteria, but reported R&D expenditures constitute a poor proxy to use to separate intangible asset intensive firms from non-intangible asset intensive firms because the total investment in R&D (including immediately expensed investments) is typically not disclosed, and many firms clearly rely on other intangible resources.

Accordingly, it is not possible to reliably classify firms on the basis of firm-level data. Rather, we first classify each firm into an industry category by collecting information from annual reports regarding the nature of each firm's main business area in each year.[4] We then divide the industries into two groups based on their likelihood of having important resources capitalized as assets (Francis & Schipper, 1999). For the sake of simplicity, we refer to these groups as traditional and non-traditional industries throughout the text. Firms operating in traditional industries are expected to undertake more investments in resources that can be capitalized. This group of industries includes industrial and consumer manufacturing, raw materials, forestry, trading, chemical production, building and construction, and transportation. In an average year, the traditional industries consist of 104 firms. Firms operating in non-traditional industries tend to undertake more investments in research and human capital. In an average year, the non-traditional industries consist of 49 firms. The non-traditional industries consist of industrial development, high-technology development, software development, consulting and other services as well as pharmaceuticals, biotechnology and medical technology.

Panel A of Table 1 presents descriptive statistics for the traditional and non-traditional industries. We note that the standard deviations appear to be smaller for the displayed variables in the non-traditional industries. However, as the values of the share price, book value and earnings are all larger in traditional industries, the relative variation is, as expected, greater in non-traditional industries. As expected,

[3] To back up this argument, we randomly select 20 annual reports from the years 1995 and 1996. 15 firms capitalize intangible assets on the balance sheet, but only four firms (20%) capitalize non-goodwill intangible assets, and the percentage of total assets is only 0.8%. Hamberg, Paananen, and Novak (2011) document that for Swedish publicly listed firms in 2001, the internally developed intangible assets capitalized on the balance sheet are 1.4% of total assets. We find that for the average non-financial firm at the Swedish stock exchange in 2010, this figure has increased to 2.3%. Our conclusion is that most investments in intangible assets are expensed immediately.

[4] Between years, no firm is reclassified from the traditional to non-traditional industry designation, or vice versa. However, a couple of firms are classified as initially being investment firms (an excluded industry category) and subsequently as manufacturing firms (an industry included as a traditional industry).

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Table 1 Descriptive statistics and correlations.

Panel A: Descriptive statistics

	Traditional (n = 2715)			Non-traditional (n = 1017)		
	Mean	Median	SD	Mean	Median	SD
BV	39.54	29.49	36.16	17.88	11.56	20.91
E	4.25	2.91	6.36	0.35	0.23	5.12
SE	5.39	2.84	25.88	0.30	0.18	6.58
UE	−1.14	0.12	25.85	0.05	−0.04	6.25
P	77.33	57.38	69.09	58.55	80.00	65.95
Book-to-market	0.637	0.510	0.48	0.487	0.322	0.53
Earnings-to-price	0.038	0.054	0.16	−0.095	0.008	0.39
Earnings-to-price[a]	0.071	0.060	0.06	0.047	0.036	0.05

Panel B: Correlation coefficients

	BV	*E*	*SE*	*UE*	*P*
BV		**0.57**	**0.14**	0.01	**0.68**
E	**0.31**		**0.13**	**0.12**	**0.58**
SE	**0.25**	**0.48**		**−0.96**	**0.13**
UE	0.02	**0.38**	**−0.63**		0.02
P	**0.59**	**0.31**	**0.12**	**0.17**	

The table provides descriptive statistics for a sample of 3732 publicly listed Swedish firms for the years from 1983 to 2004. Firms are classified into industries on an annual basis, and industries are classified into traditional and non-traditional industry categories. *BV* is the book value of equity per share, *E* is the reported net earnings per share, *SE* is the sustainable earnings per share, *UE* is the unsustainable earnings per share, and *P* is the share price. We also report the *book-to-market* ratio and the *earnings-to-price* ratio. Sustainable earnings are defined as follows:

$$SE_{i,t} = TA_{i,t-1} \cdot \left(\frac{\sum_{\tau=t-4}^{t} (E_{i,\tau}/TA_{i,\tau-1})}{5} \right)$$

where *TA* denotes the total assets. Panel A shows the means, medians and standard deviations for the key variables that are used in the empirical analysis. Panel B displays the correlation coefficients for the traditional (non-traditional) industries above (below) the diagonal. Boldface correlation coefficients are significant at the 1% level (two-sided test).

[a] Exclusive of negative earnings.

the book-to-market ratios are also considerably lower in non-traditional industries. Untabulated data indicate that depreciation charges (as a percentage of the market value of equity) are more than twice as high in traditional than in non-traditional industries. These findings are in line with e.g., Francis and Schipper (1999) and they suggest that firms in traditional industries have more capitalized investments.

Panel B of Table 1 displays Pearson correlations between the variables that are used in the regression analyses for both groups of industries. As expected, the book value of equity, net earnings and sustainable earnings are positively associated with share prices. Unsustainable earnings are associated with share prices in non-traditional industries. We note that the book value of equity and the net earnings have a higher correlation with the share price in traditional industries than in non-traditional industries.

Test results and analysis

Earnings sustainability and the level of value relevance

We begin with an analysis of the association between accounting information and share price by decomposing reported earnings using various models. Table 2 reports both the level and the standard deviation of the average annual regression coefficients. The table also reports the adjusted R^2 values and the results that are obtained when testing for the equality of the mean and standard deviation of the adjusted R^2 values between the traditional and non-traditional industries. The four panels report the results for Models (1) through (4). In Panel A, we observe the value relevance for book equity and the reported net earnings. The adjusted R^2 value is 54.1% for the full sample, and all average annual coefficients are statistically significant.[5] The level of the average explanatory power is comparable to that found in other studies; this level is, for instance, similar to the long-term average in Norway (59.8%; see Gjerde et al., 2011). There are substantial differences in the adjusted R^2 values between the two industry categories. The difference, which is an average of 14.2 percentage points in favor of traditional industries, is statistically significant (p-value: 0.005, as measured with a traditional t-test for differences in means); this result suggests that firms in non-traditional industries provide less value-relevant information than firms in traditional industries.

Next, we distinguish between sustainable and unsustainable earnings based on the three aforementioned alternative

[5] The significance level of the mean of the regression coefficients is estimated using the Fama and MacBeth (1973) methodology.

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Table 2 Industry differences in value relevance.

	n	*BV*	*E*	*SE*	*UE*	*DNEG* × *E*	R^2	*p*-Value
Panel A — Model (1)								
Traditional industries								
Average annual regressions	104	**1.11**	**2.64**				0.597	
Standard deviations		0.50	1.69				0.097	
Non-traditional industries								
Average annual regressions	49	**1.88**	**1.32**				0.455	
Standard deviations		0.70	2.90				0.199	
Full sample								
Average annual regressions	153	**1.22**	**1.90**				0.541	
Test on the equality of adjusted R^2								0.005
Test on the equality of the standard deviation of R^2								0.001
Panel B — Model (2)								
Traditional industries								
Average annual regressions	104	**0.99**	**4.02**			−4.82	0.612	
Standard deviations		0.54	2.38			3.56	0.094	
Non-traditional industries								
Average annual regressions	49	**1.56**	**5.28**			−3.89	0.565	
Standard deviations		0.84	5.67			13.84	0.225	
Full sample								
Average annual regressions	153	**1.06**	**3.66**			−5.50	0.578	
Test on the equality of adjusted R^2								0.380
Test on the equality of the standard deviation of R^2								0.000
Panel C — Model (3)								
Traditional industries								
Average annual regressions	104	**0.94**		**4.09**	**2.02**		0.614	
Standard deviations		0.62		2.79	1.51		0.080	
Non-traditional industries								
Average annual regressions	49	**1.77**		**2.98**	0.97		0.534	
Standard deviations		0.86		5.56	5.10		0.190	
Full sample								
Average annual regressions	153	**1.16**		**2.29**	**1.83**		0.581	
Test on the equality of adjusted R^2								0.082
Test on the equality of the standard deviation of R^2								0.000
Panel D — Model (4)								
Traditional industries								
Average annual regressions	104	**0.82**		**5.43**	**3.40**	**−4.24**	0.627	
Standard deviations		0.65		3.47	2.18	6.34	0.080	
Non-traditional industries								
Average annual regressions	49	**1.60**		**7.18**	**4.64**	**−7.03**	0.630	
Standard deviations		1.02		9.08	8.52	10.68	0.220	
Full sample								
Average annual regressions	153	**1.02**		**3.98**	**3.34**	**−4.17**	0.595	
Test on the equality of adjusted R^2								0.934
Test on the equality of the standard deviation of R^2								0.000

The table presents the value relevance of accounting information for the Swedish sample that is described in Table 1. It summarizes the average regression coefficients and adjusted R^2 values for the full sample as well as the traditional and non-traditional industry subsamples. Panels A–D present the results from the following regression specifications:

$$P_{it} = a_0 + a_1 BV_{it} + a_2 E_{it} + \varepsilon_{it} \quad (1)$$

$$P_{it} = b_0 + b_1 BV_{it} + b_2 E_{it} + b_3 DNEG \times E_{it} + \varepsilon_{it} \quad (2)$$

$$P_{it} = c_0 + c_1 BV_{it} + c_2 SE_{it} + c_3 UE_{it} + \varepsilon_{it} \quad (3)$$

$$P_{it} = d_0 + d_1 BV_{it} + d_2 SE_{it} + d_3 UE_{it} + d_4 DNEG \times SE_{it} + \varepsilon_{it} \quad (4)$$

DNEG is a dummy variable that is set to one when *E*\; <\; 0 and is zero otherwise. All other variables are defined in Table 1. Boldface characters denote significance at the 10% level (two-sided test).

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models. Panel B of Table 2 reports the value relevance when a dummy variable is used to capture the different properties of positive and negative earnings components. In comparison with the results for the full sample in Panel A, the adjusted R^2 value increases from 54.1% to 57.8%. The increase in the adjusted R^2 value illustrates the different valuation effects of the two earnings components. Interestingly, *DNEG* has different effects on each of the two sub-samples. The adjusted R^2 value increases little (+1.5 percentage points) for traditional industries, but a considerably greater increase (+11.0 percentage points) is observed for non-traditional industries. Thus, the separation of negative and positive earnings components has a much greater effect on the value relevance for non-traditional industries (see also the substantial increase in the regression coefficient of earnings in non-traditional industries). It should be noted that firms in non-traditional industries report losses more frequently (42% versus 11% for traditional industries; not tabulated), and this difference further contributes to explaining that an adjustment for negative earnings is more important in these industries. We interpret these findings as indicative that firms in non-traditional industries are more often influenced by events with large negative effects (e.g., investments in research prior to a product launch). A simple remedy, such as the use of a dummy, substantially affects value relevance metrics; in fact, the two industry groups are no longer significantly different from one another as measured by the adjusted R^2 value (p-value: 0.380).

Employing a dummy for negative earnings incorporates the effect of a negative unsustainable earnings component when it is greater than the (positive) sustainable earnings component. However, many unsustainable earnings components are likely to be smaller than the sustainable earnings component. Model (3), which is displayed in Panel C of Table 2, addresses this problem. All average annual coefficients, except the *UE* coefficient for non-traditional industries, are statistically significant. Our findings are consistent with the expectation that adjustments to the different properties of sustainable and unsustainable earnings components improve the association between accounting information and share prices. In comparison with Model (1), the adjusted R^2 value increases from 54.1% to 58.1% for the full sample. Again, we find that the incremental value relevance is marginal for traditional industries but substantial for non-traditional industries (+1.7 and +7.9 percentage points, respectively).

Finally, we examine whether the two models of unsustainable earnings are incrementally useful. This investigation is important because when a firm has averaged negative earnings in the last five years, Model (3) will report negative sustainable earnings. Panel D of Table 2 depicts the results when reported earnings are decomposed into sustainable and unsustainable components and combined with a dummy for negative earnings. All average regression coefficients are significant, and the adjusted R^2 value for the full sample amounts to 59.5%, which is higher than the values in any of the previous models. Thus, the results indicate that adjustments to the different properties of sustainable and unsustainable earnings components increase the overall value relevance of accounting information.

Interestingly, the adjusted R^2 values are substantially higher for both traditional and non-traditional industries than for the full sample. Compared with Model (1), when no adjustment for unsustainable earnings is made, the incremental value relevance is 3.0 percentage points for traditional industries and 17.5 percentage points for non-traditional industries. With these adjustments for unsustainable earnings, there is no difference between traditional and non-traditional industries (p-value: 0.934). We emphasize that these results do not refute past findings that value relevance is lower for firms that expense most investments immediately when using *reported* accounting information (e.g., Collins et al., 1997). However, we broaden the current perspective by demonstrating that the difference disappears when the different properties of sustainable and unsustainable earnings are considered.[6]

Research on value relevance tends to emphasize the correlation between reported net earnings and share prices. In reality, however, investors use more detailed information than merely the net earnings information (Ramakrishnan & Thomas, 1998). The degree to which reported earnings contain sustainable components substantially affects their relation to the share price; furthermore, the sustainability of earnings is highly related to accounting conservatism. Penman and Zhang (2002: p. 241) also express this concern: "If investors value firms using current earnings as an input without appreciating that those earnings are unsustainable, then market valuations will also be of low quality. But, if the analyst and investor penetrate the joint effect of conservative accounting and investment, then they will discover that reported earnings is a poor predictor of long-run "sustainable" profitability, and will value the firm appropriately." Our results show that it is possible to model the unsustainable earnings components within reported earnings that many prior value relevance studies have neglected.

In response to Gu (2007), who suggests that comparisons of value relevance across samples might be biased, we test his suggested alternative measure, a scale-adjusted root-mean-square error (RMSE), as the metric of value relevance in all of our tests. This alternative measure does not alter any of the conclusions, and we present the adjusted R^2 value rather than RMSE because it can be related to past studies and can be interpreted more intuitively. The correlation between the RMSE and the adjusted R^2 value is high. For instance, with Model (1), the correlation is -0.673 for the full sample (p-value: <0.001). We interpret the high correlation between the RMSE and the adjusted R^2 value to indicate that our research design is not severely affected by the problems that are highlighted by Gu (2007).[7]

[6] Return models provide similar results as price models (not tabulated). However, average adjusted R^2 values are lower when using the return model specification, and they are considerably more volatile between years. When both positive and negative adjustments for unsustainable earnings components are introduced into the specification, adjusted R^2 values substantially increase in all of the samples. As in the price-model tests, the differences in adjusted R^2 values between traditional and non-traditional industries are not significant when adjusting for unsustainable earnings components.

[7] The critique of Gu (2007) is relevant for comparisons of explanatory power between samples; however, much of our analysis investigates differences in the adjusted R^2 values *within* samples (i.e., for different regression specifications).

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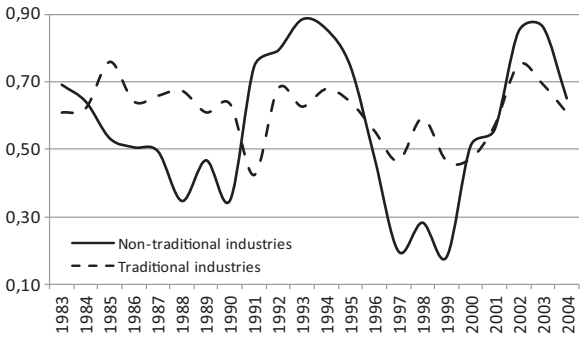

Figure 1 Variations in value relevance. The figure shows the explanatory power (adjusted R^2) for the traditional and non-traditional industry categories that are described in Table 1 (using a price model specification with a negative earnings adjustment, cf. Model (2)).

Economic conditions and the variations in value relevance

The previous analysis emphasizes that the association between accounting information and share price depends on the ability of accounting information to capture sustainable earnings. We find no significant difference in value relevance between traditional and non-traditional industries when unsustainable earnings elements are separated from sustainable earnings. However, for all four model specifications, the standard deviation of the adjusted R^2 values is more than two times higher for non-traditional industries than for traditional industries. In Table 2, tests of differences in the standard deviation of R^2 between traditional and non-traditional industries are statistically significant for all four models (p-values: <0.001). Fig. 1 instructively illustrates these results with the annual adjusted R^2 value from Model (2), wherein it is evident not only that the non-traditional industries display large temporal variations in value relevance but also that the temporal variations move in a cyclical pattern with respect to the invariable value relevance of the traditional industries.[8]

We assess whether the relative value relevance of accounting information that exists for non-traditional industries is determined by economic conditions using proxy variables for the investment level of firms and the growth expectations of investors. Because firms do not disclose the level of immediately expensed investments, it is not possible to use firm-specific information in the analysis of investment levels. Rather, we expect that firms undertake more investments when the economy is growing more rapidly. Consequently, our measure is the annual change in GDP per capita (*investment level*). To analyze how value relevance is associated with investment levels, we compare the ten years with the highest level of investment (average: +6.2% annual growth) with the ten years with the lowest level of investment (average: +2.4%). We then compare the relative value relevance (measured as the difference in the adjusted R^2 between traditional and non-traditional industries) in years when the investment level is high with years when the investment level is low. In addition, we observe the correlation between investment levels and relative value relevance.[9]

We expect a greater difference between the value relevance of traditional and non-traditional industries when the investment level is high. Panel A of Table 3 displays results that confirm this expectation. In the years in which firms are likely to have undertaken more investments, the adjusted R^2 value is 13.6 percentage points higher in traditional industries than in non-traditional industries, whereas the adjusted R^2 value of non-traditional industries is 4.5 percentage points higher than in traditional industries in years in which the investment level is low. Moreover, the correlation between the relative value relevance of accounting information in non-traditional industries and the level of investment is statistically significant (p-value: 0.048). The temporal variation that we observe is almost entirely due to variations in the value relevance for non-traditional industries. We observe that non-traditional industries are more affected by conservative accounting rules, and the findings in Panel A indicate that the bias that is created by conservative accounting is larger when the investment level is high. The difference between years with high and low investment levels suggests that economic conditions can cause differences in value relevance. Moreover, the significant correlation coefficient suggests that the relation between investment levels and relative value relevance is linear.

Furthermore, because firms in non-traditional industries have fewer capitalized resources, they are surrounded by greater uncertainty, which is expected to direct noise traders to more eagerly trade their shares (Dontoh et al., 2004). Noise trading is likely to be more frequent when there are high growth expectations. We measure growth expectations as the stock market's equal-weighted average book-to-market ratio (*growth expectation*). To analyze how value relevance is associated with growth expectations, we compare the ten years with the highest growth expectations (average book-to-market ratio: 0.42) with the ten years with the lowest growth expectations (average book-to-market ratio: 0.78). In addition, we observe the correlation between growth expectations and relative value relevance. The reader should note that the correlation coefficient between investment level and growth expectations is -0.70 (not tabulated). Thus, even if the two metrics of economic conditions are not substitutes, they have considerable information overlap.

Panel B of Table 3 displays the analysis based on growth expectations. When these expectations are high, value relevance is 14.1 percentage points higher in traditional industries than in non-traditional industries, whereas non-traditional industries exhibit an adjusted R^2 value that is 5.1 percentage points higher than that for traditional industries when growth

[8] An interesting topic for future research could be to investigate if the correlation between the value relevance of respectively traditional and non-traditional industries is time-varying. From Fig. 1, it appears that the correlation is much lower in the eighties than in the nineties. One possible explanation is that the stock market's valuation of non-traditional industries was more imprecise in the early years of these companies' history.

[9] Because our adjustment for unsustainable earnings is not standard (i.e., Models (3) and (4)), we present results for the relative value relevance as derived using Model (2). However, no conclusion is dependent on the choice of model specification.

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Table 3 Variations in value relevance, investment levels and growth expectations.

	Traditional industries	Non-traditional industries	VR difference
Panel A: Level of investment			
High investment level	0.616	0.481	0.136
Low investment level	0.603	0.649	−0.045
Correlation between GDP growth (level of investment) and VR difference: 0.45 (p-value = 0.048)			
Panel B: Growth expectations			
High growth expectations	0.613	0.472	0.141
Low growth expectations	0.607	0.657	−0.051
Correlation between BM ratio (growth expectations) and VR difference: −0.60 (p-value = 0.005)			

The table shows the value relevance (adjusted R^2) of accounting information for the period from 1983 to 2004, conditional on the level of investment (Panel A) and growth expectations (Panel B). Each panel is divided into two parts: the first part displays the average adjusted R^2 value for the ten years with the most favorable economic conditions, and the second part displays the mean adjusted R^2 value for the ten years with the poorest economic conditions. The results are presented for traditional and non-traditional industries as well as for the differences between the two samples (VR difference). Each panel also lists the correlation coefficient between the VR difference and the indicators for the level of investment (the annual change in GDP per capita) and growth expectations (the equal-weighted average book-to-market ratio for all non-financial firms at the Stockholm Stock Exchange). Value relevance is measured using a price model specification with a negative earnings adjustment (cf. Model (2)).

expectations are low. As in the previous panel, there is little variation in traditional industries; essentially, all changes in the relative value relevance are caused by temporal variations in the value relevance of non-traditional industries. The correlation between the difference in value relevance and growth expectations is statistically significant (p-value: 0.005).[10]

For robustness reasons, we omit from the sample the two highest and lowest observations of both investment level (i.e., the change in GDP per capita) and growth expectations (i.e., the book-to-market ratio), and we re-perform all analyses on the truncated sample (not tabulated). All tests withstand this alternative sample selection procedure. Although the results are encouraging, they are derived from an analysis with a limited amount of observations. Furthermore, the change in GDP per capita and the book-to-market ratio are noisy measures of investment level and growth expectations, respectively; thus, it seems advisable to replicate the analysis in different settings before drawing formal conclusions. Nonetheless, the data clearly demonstrate that the relative value relevance of non-traditional industries is significantly associated with growth in GDP and the book-to-market ratio.

Conclusions

Conventional conservative accounting standards hinder firms from capitalizing some of their investments in valuable resources; rather, these investments are immediately expensed. The consequence of these behaviors is that earnings become more akin to cash flows; thus, when substantial investments are undertaken, earnings decrease, even when such investments actually increase future performance. We show that firms undertaking more investments that are immediately expensed have more unsustainable earnings and lower value relevance. However, the effects of these unsustainable earnings components on value relevance are easily removed in our models. When we eliminate these effects, there is no difference in value relevance between traditional and non-traditional industries.

Although the models that are used to decompose reported earnings into its sustainable and unsustainable components can remove differences in the level of value relevance, these models are incapable of removing differences in the temporal variation in value relevance. Firms operating in non-traditional industries, in which more valuable resources cannot be capitalized, consistently show more variation in value relevance. Moreover, these variations are systematic over time and associated with our two measures of economic conditions: the level of investment and growth expectations. When investment levels and growth expectations are high, firms operating in non-traditional industries display considerably lower value relevance. This finding is consistent, independent of the earnings decomposition model that is used.

The empirical results are strong and exhibit a high level of statistical significance. However, because the interpretation of the results is rather open, a caveat is necessary. In particular, the reader should note that our empirical measures are not perfect proxies of our theoretical constructs; thus, there is ample space for future research. Our analysis relies heavily on the distinction between traditional and non-traditional industries. Although there are differences between these two industry groups, we do not know the specific causes of these differences. We believe that non-traditional industries undoubtedly have more non-capitalized resources; however, firms in non-traditional industries might also be younger and less diversified, may grow more rapidly, and may have different ownership structures. It is beyond the scope of this paper to examine the effects of these other factors on value relevance. If such differences exist and are able to explain the level of and temporal variation in value relevance, then such an investigation would be an interesting endeavor.

A similar caveat exists for the test of value relevance under different investment levels. Because the investments that we investigate are typically undetectable in financial

[10] The relative value relevance for non-traditional industries is also negatively related to investment levels and growth expectations when a return regression model is applied.

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statements (i.e., they are immediately expensed and bundled with all other expenses), we use growth rates at the country level as our proxy. This measure could be correlated with other macro-economic variables. In fact, we have already shown that the change in GDP per capita and the book-to-market ratio are highly correlated. The patterns in the empirical study are relatively clear, but the interpretation is somewhat open. Again, further research is needed.

One of the most important objectives of value relevance research is to study differences in the usefulness of various accounting methods from an investor perspective. We believe that it is of utmost importance that varying proportions of unsustainable earnings and changing economic conditions do not distort researchers' conclusions regarding value relevance in different time periods and under different accounting regulations. For this reason, the models we use to decompose reported earnings can serve as a departure point in future comparative analyses. Moreover, the fact that the level of value relevance is systematically associated with measures of economic conditions suggests that future comparative analyses should control for differences in the economic conditions — particularly when firms in the sample are likely to immediately expense many of their investments.

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