Comparative Value Relevance Among German, U.S. and International Accounting Standards: A German Stock Market Perspective

Eli Bartov
New York University
Stern School of Business
40 W. 4th St., Suite 423
New York, NY 10012
ebartov@stern.nyu.edu

Stephen R. Goldberg
Grand Valley State University
Seidman School of Business
401 W. Fulton St.
Grand Rapids, MI 49504
goldbers@gvsu.edu

Myung-Sun Kim
University of Missouri-Columbia
School of Accountancy
327 Cornell Hall
Columbia, MO 65211
sunkim@missouri.edu

June 2002

Comparative Value Relevance Among
German, U.S. and International Accounting Standards:
A German Stock Market Perspective

ABSTRACT

In recent years, German companies report consolidated financial statements under German GAAP, U.S. GAAP, or International Accounting Standards (IAS). Market observers, researchers, and regulators have argued that financial statements prepared under the shareholder (or investor) model, such as U.S. GAAP or IAS, provide better information than financial statements prepared under the stakeholder model (German GAAP). They further have argued that U.S. GAAP is more rigorously defined and, therefore, provides superior information to IAS. We investigate comparative value relevance, measured as the slope coefficient of the returns/earnings regression. Our results are consistent with expectations. Within our sample of German companies traded on German stock exchanges, value relevance of U.S. GAAP based earnings is higher than that of IAS based earnings, which in turn is more value relevant than earnings produced under German GAAP. A major contribution of this research is that, unlike prior research, we measure stock returns for all sample firms in the German stock market only, and therefore are not reliant on the perhaps strong assumption underlying prior studies of similarity of pricing across markets domiciled in different countries.

Key Words: Value relevance, International accounting standards, German accounting standards, U.S. GAAP, Accounting earnings.

Data Availability: All data are available from public sources.

Comparative Value Relevance Among
German, U.S. and International Accounting Standards:
A German Stock Market Perspective

1. Introduction

U.S. Generally Accepted Accounting Principles (GAAP) and International Accounting Standards (IAS) compete for international acceptance as reporting standards for capital markets around the world and in the U.S. Currently, the Securities and Exchange Commission (SEC) is considering the quality and acceptability of IAS, and has issued a Concept Release (SEC 2000), seeking advice on this issue. There is, however, only minimal market based evidence on the comparative quality of these two reporting regimes. In this research, we compare the value relevance of earnings produced under three accounting regimes, German GAAP, U.S. GAAP and IAS, by considering the association of stock returns and reported earnings as a measure of quality of accounting standards.[1]

U.S. GAAP and IAS were developed in environments where accounting practices are developed primarily in the private sector, reporting rules are largely unencumbered by taxation requirements, and capital is traditionally raised in public markets. Thus, the primary focus of U.S. GAAP and IAS is the needs of current and prospective shareholders for relevant and reliable information. Conversely, German standards were developed in a highly politicized environment serving a number of stakeholders including taxation requirements, which tends to highlight smooth earnings streams rather than

1 The term U.S. GAAP is defined in Statement on Auditing Standards No. 69, *The Meaning of Present Fairly in Conformity with Generally Accepted Accounting Principles in the Independent Auditors' Report*. Conversely, the term GAAP is not defined formally in Germany. Still, we use the term German GAAP throughout the paper to simplify terminology.

earnings informativeness.[2] Therefore, we expect and find that earnings produced under U.S. GAAP or IAS has higher value relevance than earnings determined under German accounting rules. We also find evidence of U.S. GAAP having higher value relevance than IAS for two subsamples consisting of: (1) Neuer Markt firms, and (2) small firms. This evidence is consistent with findings in Ashbaugh (2001) and claims put forward by the Financial Accounting Standards Board (FASB 1999) that IAS is of lower quality than U.S. GAAP.

Previous research has investigated value relevance and timeliness of earnings reported under different accounting standards in their own country, and then compared levels of value relevance and timeliness (see, e.g., Alford et al. 1993 and Ball et al. 2000). We extend this previous research by examining exclusively German companies trading in German stock exchanges. This enables us to hold constant institutional factors such as listing requirements, other disclosure requirements, regulatory environment, and other market microstructure, that may confound the results, thereby enhancing the reliability of our findings. A limitation of this research is that we may not fully control for factors influencing selection of type of accounting standards.

The remainder of the paper is organized as follows. The second section contrasts U.S. GAAP, German GAAP, and IAS. The third section reviews previous empirical market research addressing value relevance of international and national accounting

2 An example that demonstrates the focus of German accounting rules on earnings smoothing is excess depreciation. German companies purchasing qualifying assets are entitled to write-off more than 100 percent of an asset's cost. This excess depreciation, which is credited to a balance-sheet provision, "special items with an equity portion," is reversed to earnings in future periods, in which the firm performance is relatively poor. Footnote 14 on the 2000 Volkswagen Group annual report provides an insight into the magnitude associated with this type of smoothing behavior. Specifically, the footnote reveals that 2.8 billion DM (41 percent of pre-tax profit) of operating income resulted from the elimination of provisions.

standards. The fourth section provides a brief background on German capital markets, particularly the Neuer Markt. Section 5 outlines the sample selection procedure and describes the data. Section 6 presents the model we use in the empirical analysis and defines the variables. The seventh section reports the results of the empirical analysis. The final section summarizes the study's main findings.

2. U.S. GAAP, German GAAP, and IAS

Earnings are cash flows adjusted for accruals. Each country or standard setter designs its own rules for earnings recognition and sets bounds on management's discretion in determining earnings. Different sets of accounting standards as well as differences in enforcement determine the limits on differences of reported earnings for the same economic results. Differences in objectives of reported financial information and opportunistic use of accruals by management could result in varying levels of value relevance of earnings as reflected in the statistical association between earnings and stock returns.

In common-law countries (U.S. and IAS models), accounting rules are determined largely by the disclosure needs of shareholders and prospective shareholders. Capital is generally raised in public stock and bond markets. The problem of asymmetric information between managers and shareholders is addressed through financial reporting and other means of timely public disclosure. In a common-law environment, accounting standards evolve by becoming commonly accepted in practice and are generally separate from tax laws. In other words, accounting standards arise in an accounting market and are not determined by government.

Conversely, under the code-law (German) model, governments, shareholders, debt holders, employees, and managers are viewed as stakeholders. Net income is distributed amongst stakeholders, as pay increases to employees, bonuses to managers, tax to government, and dividends to shareholders. Code-law corporate governance is conducted by elected or appointed agents for stakeholders. In Germany, traditionally, banks play a key role in providing finance and representing investors. Agents of stakeholders tend to be informed by private and inside access to information. This reduces the need for timely public disclosure of income. Also, the incentives (e.g., minimizing taxes) and opportunities (e.g., reserve accounting) to reduce earnings volatility are higher in code-law countries. Specifically, with financial reporting the same as tax reporting and with progressive income tax rates, smoothing earnings results in reductions and delays of tax payments. Reduced earnings volatility also results in smoother patterns of dividend distributions as well as compensation adjustments, which are institutionally linked to reported earnings. With respect to opportunities, acceptable alternatives within accounting rules such as reserve accounting and excess depreciation permit greater opportunity to manage earnings.

In summary, code-law accounting provides greater incentives and opportunities to smooth income than common-law accounting. Reduced volatility is achieved at the expense of timeliness of conveying value relevant information.

While U.S. GAAP and IAS both focus on investors' needs, differences exist between these two sets of rules. In a comparison between U.S. GAAP and IAS, FASB (1999) found 250 key differences in four categories: recognition, measurement, permissible alternatives, and lack of guidance or requirements. The FASB concludes that

IAS is of lower quality than U.S. GAAP (see, *The Wall Street Journal* 1999). The European Union (EU), which is currently considering requiring companies listed on European stock exchanges to adopt IAS, disagrees. For example, a EU spokesman was quoted in *The Wall Street Journal* 2002 as saying "We believe IAS is superior to GAAP. We believe it offers investors the best view of the situation of a company in which investor might want to invest." Accounting researchers and company managers have yet another view. They argue that from an investor's point of view, there is essentially no difference between the two sets of standards. For example, a survey by KPMG (2000) shows that CFOs of large European companies view IAS as offering similar quality to U.S. GAAP, but is less expensive to implement because of the level of complexity and detail contained in U.S. GAAP. Harris (1995) computes earnings for eight companies under both U.S. GAAP and IAS and concludes that they are essentially similar.

3. Prior Market Based Studies on Comparative Earnings Quality

Alford et al. (1993) find that the association between earnings and stock returns is stronger in countries where capital is traditionally raised in capital markets and there are weaker links between financial and tax reporting (i.e., Anglo-Saxon countries). They used pooled regressions to estimate the relation between annual earnings and 15-month returns for each of their sample countries separately. According to their measure of information content (a comparison of the regressions' r-squares), annual earnings from the U.K. and the U.S. are more informative than earnings from Germany.

Joos and Lang (1994) investigate the financial statement effects of differences in accounting measurement practices in France, Germany, and the U.K. Unlike Alford et

al., they find no evidence that measurement practices in the U.K. resulted in accounting numbers with a higher association with stock price than in Germany. Consistent with Joos and Lang's results, Harris, Lang, and Moeller (1994) find the correlations between stock returns and earnings in Germany and the U.S. to be similar.

Harris and Muller (1999) examine 20-F reconciliations from IAS to U.S. GAAP and find that IAS are closer to U.S. GAAP than other non-U.S. GAAP in terms of magnitude of the reconciling items. They also find that the reconciliation's are value relevant.

Frost and Pownall (2000) investigate disclosures of firms cross-listed in both U.S. and U.K. markets. They find that firms do not disclose the same information simultaneously in both markets. Further, they find little evidence of U.S. or U.K. price response to disclosures released only in the other country. They conclude that direct and simultaneous disclosure in each market is necessary to ensure equal access to information for these cross-listed firms.

Ball et al. (2000) compare timeliness of earnings reported by firms in common-law countries and code-law countries. They find that common-law earnings exhibit greater timeliness than code-law earnings, but this greater timeliness is driven entirely by greater sensitivity to accounting losses (income conservatism).

In summary, the mixed findings in this international accounting literature suggest the following question is still open: do earnings reported in the U.S. or other Anglo-Saxon countries better explain stock returns than earnings reported in Germany or other non-Anglo-Saxon countries? Our research design has an important advantage over this research, which compared the results of regressing returns on earnings across countries.

Such comparisons rely on strong, perhaps even unrealistic, ceteris paribus assumptions, e.g., identical capital market microstructures. The conflicting findings of this prior literature may result from differences among national macro- and micro-economic environments. Our approach does not suffer from this limitation. We look exclusively at German companies trading within the German market. Therefore, we do not rely on the assumption that market structures and pricing mechanisms are identical. Our approach may shed light on the conflicting results as to whether U.S. GAAP, German GAAP, or IAS better captures stock price changes.

Our approach of comparing firms reporting under different accounting regimes but traded on the same stock exchange has been used by two recent studies: Leuz and Verrecchia (2000) and Leuz (2001). Leuz and Verrecchia (2000) test the theory that a commitment by a firm to increased levels of disclosure lowers the information asymmetry component of the firm's cost of capital. They analyze a sample of German firms that switch from German GAAP to IAS or U.S. GAAP. They show that this international reporting strategy is associated with statistically significant lower bid-ask spreads and higher share turnover. These constructs are proxies for information asymmetry and market liquidity. They conclude that their evidence is consistent with the idea that firms reap economically significant benefits from committing to increased levels of disclosure required by IAS and U.S. GAAP. A finding of higher earnings quality of U.S. GAAP, and IAS over German GAAP in our research would thus be consistent with the Leuz and Verrecchia findings, as higher quality of reported earnings may be a contributing factor to the overall improvement in disclosure quality that they document.

Leuz (2001) investigates value relevance of earnings produced under U.S GAAP or IAS by examining differences in bid-ask spread and trading volume using a sample of firms trading in Germany's Neuer Markt. Neuer Markt firms must report under either U.S. GAAP or IAS. If U.S. GAAP is superior to IAS, then firms reporting under U.S. GAAP should have lower information asymmetry and higher market liquidity. He finds statistically and economically insignificant differences in bid-ask spread and share turnover between IAS and U.S. GAAP firms. Supplemental analyses confirm the primary results of the research. Specifically, no significant differences are found examining dispersion of analysts' forecasts as a proxy for information asymmetry and analyzing firms' standard choices to control for selection bias. He concludes that his findings do not support that U.S. GAAP is of higher quality than IAS. The results are consistent with the view that IAS and U.S. GAAP are comparable in their ability to reduce information asymmetries in capital markets and that remaining differences between the two standards are of little importance to investors. The choice between the two standards is thus of second order importance to other institutional factors.

While like us, Leuz and Verrecchia (2000) and Leuz (2001) compare firms reporting under different accounting regimes but traded on the same stock exchange, there is an important difference between these two papers and our paper. Leuz and Verrecchia (2000) and Leuz (2001) examine differences in bid-ask spreads and trading volumes, which indicate differences in information asymmetry among investors resulting from differences in the totality of available public information, not only the public information released via earnings reports. This difference between the studies may lead to different inferences. For example, it is arguable that firms compensate for low quality

accounting standards with other disclosures. Thus, Leuz's failure to find differences in bid-ask spread and trading volumes among his sample firms is consistent with equality in the availability of public information among his sample firms, not necessarily equality in the value relevance of earnings produced under U.S. GAAP or IAS.

4. German Stock Markets and the Reporting Environment

The inception of the Neuer Markt in 1997 marks an important change in the German capital market.[3] Firms trading on Germany's "New Market" are growth firms, mainly concentrated in the Internet, technology, financial services, and biotechnology. Firms may not use German GAAP for financial reporting. Rather, they are required to choose between IAS and U.S. GAAP, and to release quarterly and annual financial reports. Disclosure and listing requirements are stricter than other German stock markets, and for the most part are comparable to those of NASDAQ, with the intention to promote transparency and investor protection. It is geared towards small and medium size firms in innovative and fast growing industries. At the initial public offering (IPO), firms must be at least three years old, have a minimum free float of twenty percent, have detailed disclosure requirements, and agree to a six-month lock-up period.

As of the end of 2000, 338 companies are listed on Neuer Markt with market capitalization of around 115 billion Euros. The Neuer Markt is the biggest market among European growth markets in terms of number of companies, capital raised, market capitalization, the number of IPOs, and turnover. With an average daily turnover of

3 The Deutsche Boerse AG operates and administers the Frankfurt Stock Exchange, the Xetra, and the Neuer Markt (http://deutsche-boerse.com).

about 485 million Euros, nearly 75 percent of the total trading volume in growth stocks in Europe are executed on Neuer Markt.

The reporting environment in Germany has changed recently as well. Until April 1998, German firms were required to prepare consolidated financial statements according to German GAAP. In response to pressure from German firms who were preparing two sets of statements or desirous of complying with international reporting standards, the German Parliament and Federal Council ratified the Law to Facilitate the Raising of Capital (KapAEG). This law allows exchange-listed corporations to prepare consolidated financial statements in accordance with IAS, U.S. GAAP, or German GAAP.

5. Sample Selection and Data Sources

The sample selection procedure, summarized in panel A of table 1, begins by retrieving accounting and stock-return data from the financial and industrial active and issue files of the 2000 Global Vantage. Of the initial 699 firms (4,323 firm-years) for which accounting and return data are available, we select firms that provide fully consolidated financial statements covering a 12-month period. This reduces the number of firms (firm-years) to 628 (3,570). After deleting missing observations and extreme observations (top or bottom 1% of the returns and earnings variables), the final number of firms (firm-years) for the 1991-2000 sample period used in the supplementary tests reported in table 5 below is 441 (2,138), and the final number of firms (firm-years) for the 1998-2000 sample period used in the primary tests reported in tables 1-4 is 416 (917). We select the three years, 1998-2000, as our sample period because in 1998 the German Parliament and Federal Council enacted the Law to Facilitate the Raising of Capital.

Panel B of table 1 displays the distribution of stock exchanges of our sample firms for the 1998-2000-sample period by accounting regime. The vast majority of firms using German GAAP (617 out of 680) are listed on the Frankfurt stock exchange and none listed on the Neuer Markt, as it requires listed firms to use either U.S GAAP or IAS. Nearly two thirds of the firms using IAS (101 out of 158) are listed on the Frankfurt and one third (50) on the Neuer Markt. Of the 79 sample firms using U.S. GAAP, 42 are listed on the Frankfurt exchange and 35 on the Neuer Markt.

We use the Global Vantage accounting standard codes to classify firms into German GAAP group, IAS group, or U.S. GAAP group. If the accounting standard code of a firm is 'US', 'DU', or 'DT', the firm is classified into the U.S. GAAP group. If the accounting standard code of a firm is 'DI' or 'DA', the firm is classified into the IAS group. If the accounting standard code of a firm is 'DS', the firm is classified into the German GAAP group.[4] To the extent that the Global Vantage accounting standard codes contain classification errors, the results below are stronger than they appear.

We use the 12-month return data provided by The Research Insight version of Global Vantage. When a firm has multiple issues of common shares, we consider the common stock issue of the highest market value as the firm's primary issue and use the return of that issue as our dependent variable.

4 The following describes the Global Vantage accounting standard codes used in this paper.
DA: Domestic standards generally in accordance with International Accounting Standards Committee (IASC) and Organization for Economic Cooperation and Development (OECD) guidelines.
DI: Domestic standards generally in accordance with IASC guidelines.
DT: Domestic standards in accordance with principles generally accepted in the US.
DU: Domestic standards generally in accordance with US GAAP.
US: US standards
DS: Domestic standards

We define a firm as cross-listed if the firm is listed on NYSE, AMEX, NASDAQ, or the London Stock Exchange. We obtain the cross-listing information from the websites of the NYSE, AMEX, NASDAQ, and London Stock Exchange.

6. Model, Variable Definitions, and Descriptive Statistics

The model used for the empirical analysis is:

$$RET_{it} = \beta_0 + \beta_1 US_{it} + \beta_2 IAS_{it} + \beta_3 E_{it} + \beta_4 E_{it}*US_{it} + \beta_5 E_{it}*IAS_{it} + e_{it} \quad (1)$$

where, $RET_{i,t}$ is the 12 month buy and hold stock return for the period ending three months after fiscal year end for firm i in year t.[5] $US_{i,t}$ ($IAS_{i,t}$) is a dummy variable that equals one if financial reporting is based on U.S. GAAP (IAS) and zero otherwise. $E_{i,t}$ is income before extraordinary items for year *t*, divided by the market value of equity (MVE) at the beginning of the year. MVE is the market value of equity computed as the closing price multiplied by the number of common shares outstanding.

In general, the relation between an accounting variable of interest (e.g., unexpected earnings or cash flows) and returns can be explored by using either an "event" study or an "association" study methodology.[6] In estimating model (1), however, the latter must be used, because for German firms earnings announcement dates are hard to determine and daily stock returns are unavailable in a machine-readable form from Global Vantage.

---

5 As a sensitivity check, we replicate the tests below using a 12-month buy and hold stock return for the period ending six months (rather than three months) after fiscal year end and obtained similar results.

6 In an event study, returns are measured over a short interval (i.e., a few days) around the announcement date, whereas in an association study longer windows are used (e.g., fiscal quarters or even years). The choice of the length of the event window involves a tradeoff. While windows that are too wide increase the noise-to-signal ratio and thereby decrease the power of the experiment, windows that are too narrow might exclude the event of interest and thereby bias the parameter estimate on the accounting variable that captures that event toward zero.

Coefficients β_4 and β_5 on the interaction terms of the accounting standard dummy variables (U.S. or IAS) and earnings (E) reflect the differential effect of reporting under U.S. GAAP or IAS over German requirements. If financial reporting under U.S. GAAP or IAS provides greater value relevance than German GAAP, then either β_4 or β_5 would be significantly positive, respectively.

Table 2 provides comparisons of descriptive statistics across our various subsamples. Panel A provides comparisons for subsamples formed by accounting standards, and panel B provides comparisons between Neuer Markt and non-Neuer Markt firms. Variables are as defined above. In addition, MB is the market value of equity divided by total stockholders' equity, LEV is financial leverage computed as total liabilities divided by total assets, and ASSET is total assets in millions of Deutsche Mark (DM).

The results displayed in panel A indicate there are significant differences among the three subsamples with respect to important firm characteristics. Specifically, the annual returns of firms reporting under German GAAP exceed significantly those of firms reported under either U.S. GAAP or IAS. Given that relatively large percentage of firms using U.S. GAAP or IAS are high technology firms traded on the Neuer Markt, and given the stock price meltdown of this sector in 2000, this result is expected. The three subsamples also differ in firm size: firms using IAS are larger than firms using U.S. GAAP, which in turn are larger than firms using German GAAP. The subsamples also generally differ in earnings scaled by price (E), market to book ratios (MB), and in leverage (LEV). Furthermore, the results in panel B of table 2 reveal there are significant differences with respect to the above firm characteristics between Neuer Markt firms and

non-Neuer Markt firms. These differences may confound our findings, and thus call for a research design that considers their potential effects on the results.

7. Results

Panel A of table 3 presents the regression results of model (1) for the entire sample (first line), as well as for the same sample excluding firms cross-listed on both German exchanges and London, or U.S. exchanges (second line). The results for the entire sample show that the coefficients on the dummy variables, β_1 and β_2, are negative and significant indicating that returns on firms reporting under either U.S. GAAP or IAS, on average, have lower returns than firms reporting under German requirements. This reflects the significant drop in the stock prices of high technology firms in the year 2000, and follows because, as noted above, relatively high number of these firms used either U.S. GAAP or IAS. As expected, coefficients on the interaction terms, β_4 and β_5, are positive, 3.25 and 1.96, respectively, and highly statistically significant. These results are consistent with superior value relevance for both U.S. GAAP and IAS over German requirements. As shown in the last column, we test for equality of the interaction coefficients, β_4 and β_5. We reject the null of equality at the 10% levels, thereby providing (weak) support for U.S. GAAP having higher value relevance than IAS.

To assess whether cross listing confounds our tests, we replicate the analysis for the full sample after removing cross-listed firms. The motivation for this sensitivity check is twofold. First, the pricing of firms listed in multiple markets may differ from that of firms traded exclusively in Germany. Second, cross-listed firms are subject to additional disclosure, scrutiny, and other regulatory requirements that may affect the

returns/earnings relation. For example, firms that are cross-listed in the U.S. must follow SEC rules, which require these firms to either report under U.S. GAAP or reconcile reported earnings and stockholders' equity to U.S. GAAP. There is no SEC counterpart in Germany. Still, the results reported in the second line of panel A demonstrate that cross listing does not represent a problem for our analysis, as the results are quite similar to those of the entire sample displayed in the first line.

Panel B reports the results of sensitivity analyses that consider whether omitted variables confound our findings, by augmenting equation (1) with three explanatory variables. The three variables are: market to book ratio, leverage, and firm size (natural log of total assets). We select these three variables because the results in table 2 indicate the three subsamples differ significantly with respect to them, and because prior research has shown that these variables are important in explaining the cross-sectional variation in stock returns.

Reading across panel B, we note two points. First, as before, the coefficients on the two interaction variables, E*US and E*IAS, are positive, 2.80 and 1.76, and highly significant. This increases our confidence that the findings regarding the higher value relevance of both U.S. GAAP and IAS over German GAAP reported above are not due to misspecified statistical tests. Second, the F-tests of the null for equality between value relevance of earnings produced under U.S. GAAP and IAS are not rejected, casting doubts on the reliability of the findings from the F-tests reported in panel A.

However, this failure to reject the null may be due to reduced statistical power introduced by the addition of the three control variables, two of which turn insignificant. To assess this possibility, we rerun the augmented equation (1) after dividing the sample

into two groups formed on the basis of firm size. The intuition underlying this analysis is that it is plausible that differences in value relevance of accounting regimes will be most pronounced for small firms. For large firms the information environment is much richer, and differences in value relevance of accounting rules may be masked by information released through sources other than financial statements. Panel C reports the results, which support the intuition above. That is, the F-test for the null of equality between U.S. GAAP and IAS is not rejected for the subsample of large firms (size variable above sample median), but is rejected for the subsample of small firms (size variable below sample median).

Panel D of table 3 reports the results of sensitivity analysis that considers whether loss firms confound our findings by estimating the regression model for profit firms and loss firms separately. This analysis is motivated by findings in prior research showing that the association between returns and earnings depends on the earnings' sign (see, e.g., Hayn 1995). As expected, for the profit firm sample the coefficients on the two interaction variables, E*US and E*IAS, are positive and statistically significant. In contrast, in the loss sample, earnings are not significantly associated with stock returns for all three accounting regimes, as evident by the insignificant coefficients on the earnings variable, E, and the two interaction variables. Hayn (1995) reports similar findings for her US sample. These results suggest that the superiority of US GAAP and IAS over German GAAP applies only to profit firms; neither regime provides value relevant earnings information when a loss is reported.

Next, we examine a possible stock exchange effect on our findings. Recall that results in panel B of table 1 indicate that our sample firms are listed on seven different

German stock exchanges, one of which, the Neuer Markt, is particularly different from the others in terms of its listing requirements (more stringent) and the type of listed firms (primarily high technology Internet firms). We thus replicate the analysis reported in panel A of table 3 after adding a dummy variable, NEU_{it}, that is set to 1 if firm *i* in year *t* is listed on the Neuer Markt and to zero otherwise. This allows us to compare the value relevance of earnings by stock exchange, thereby ensuring that our findings of differential value relevance between U.S. GAAP and IAS is not merely a stock exchange effect. Table 4 reports the results for this test of potential stock exchange effect. There are two salient points to note. First, as before, the results show that U.S. GAAP and IAS are both superior to German GAAP in terms of their value relevance. Second, F-tests for equality between U.S. GAAP and IAS for the subsample of non-Neuer Markt firms, i.e., $\beta_3 = \beta_5$, failed to reject the null, whereas F-tests for equality between U.S. GAAP and IAS for the subsample of Neuer Markt firms, i.e., $(\beta_3 + \beta_4) = (\beta_5 + \beta_6)$, produce significant results. Overall, these findings are consistent with those displayed in table 3 and indicate that at least for a subsample of firms U.S. GAAP based earnings have higher value relevance than IAS.

Finally, we compare the association between stock returns and earnings before and after German firms switch from German accounting standards to either U.S. GAAP or IAS. For the Standard-Change firms, the change year is the year when the actual change is made. Two control samples are selected. The first is an industry-matched control sample, which is identified based (primarily) on two-digit standard industrial classification (SIC) codes. If no match is available within the same two-digit SIC code, then one-digit SIC code is used to get a matching firm. The second is a size-matched

control sample, which is identified based on total assets at the end of the period. For the two control samples, the change year is the matching treatment firm's change year.

We perform the comparison by estimating the following model:

$$RET_{it} = \beta_0 + \beta_1 POST_{it} + \beta_2 E_{it} + \beta_3 E_{it} * POST_{it} + e_{it} \quad (2)$$

where, RET_{it} and E_i are as defined above and $POST_{it}$ is a dummy variable that equals 1 in the year of and after the switch to U.S. GAAP or IAS, and zero otherwise. To be included in this analysis, a firm must have at least two earnings observations in the pre-change period and two in the post period. If switching from German GAAP to either U.S. GAAP or IAS results in an increase in value relevance of earnings, the coefficient on E*POST, β_3, should be positive.

Panels A, B and C, of table 5 report the results of the analyses for firms changing reporting standards. The standard-change sample size deserves an explanation, as it includes only 37 distinct firms, a small percentage of our original sample of 441 distinct firms reported in table 1. The reason for the small sample size is that only 63 firms have switched accounting regime during 1994-2000, of which 26 fail to satisfy the requirement of having at least two earnings observations in the pre-change period and two in the post period.[7] This requirement also explains why the number of firm-year observations differs between the test and control samples. In all panels the estimate of interest is β_3. The results in panel A show that, as expected, β_3 is positive and significant for the Standard-Change firms and insignificant for the control firms. Thus, the switching to either U.S. GAAP or IAS results in a stronger association between returns and earnings, indicating

7 The distribution of the 63 standard-change firms by year is as follows: 3 (1994), 2 (1995), 1 (1996), 5 (1997), 16 (1998), 28 (1999), and 8 (2000).

improved value relevance. The results in panels B and C reinforce the results in panel A in that they demonstrate that the stronger association between returns and earnings following the switch in accounting regime holds for U.S. GAAP and IAS subsamples individually.

8. Conclusion

In recent years, German companies report consolidated financial statements under German accounting requirements, U.S. GAAP, or International Accounting Standards (IAS). We investigate comparative value relevance of earnings reported under these alternatives. Researchers have argued that financial statements prepared under the shareholder (or investor) model, such as U.S. GAAP or IAS, provide better information than financial statements prepared under the stakeholder model (German GAAP). Further, some have argued, U.S. GAAP is more rigorously defined and, therefore, provides superior information to IAS. We use alternative analyses to investigate comparative value relevance. We measure value relevance as the regression coefficient of returns on earnings prepared under various GAAPs. Our results are consistent with expectations. Within our sample of German companies, value relevance is higher for earnings prepared under either U.S. GAAP or IAS over earnings prepared under German GAAP. A comparison between value relevance of earnings produced under U.S. GAAP and IAS generates evidence indicating the superiority of the former for two subsamples: (1) Neuer Markt firms, and (2) small firms.

Previous research measures earnings and stock market returns in various countries with the assumption that price formation is roughly the same across countries. A major

contribution of this research is that we measure stock returns for all sample firms in the German stock market only, and therefore are not reliant on the assumption of similarity of pricing across markets.

Finally, we comment on two limitations. First, our analysis has only limited control for self-selection bias. There are reasons why firms select the accounting standards that they select. Partially mitigating this limitation, in the accounting change analysis, we control for industry and size. However, there may still be a systematic bias that influences our results. A second limitation is that we exclusively analyze German companies. There may be unique aspects to German companies operating within a German environment, which limits the ability to generalize the results to firms operating in other socio-economic environments. However, this second limitation would likely work against finding superior value relevance for U.S. GAAP and IAS over German accounting.

References

Alford, A., J. Jones, R. Leftwich, and M. Zmijewski, 1993. The relative informativeness of accounting disclosure in different countries, *Journal of Accounting Research* 31 (Suppl.), 183 - 223.

Ball, R., S.P. Kothari, and A. Robin, 2000. The effect of international institutional factors on properties of accounting earnings. *Journal of Accounting and Economics* 29, 1–51.

Financial Accounting Standards Board (FASB), 1999. *The IASC-U.S. Comparison Project: A report on the similarities and differences between IASC standards and U.S. GAAP*, second edition, Norwalk, CT.

Frost, C.A. and G. Pownall, 2000. Equal access to information: Do cross-listed firms' stock prices respond to earnings disclosed in overseas and local markets? *Asia Pacific Journal of Accounting and Economics* 7, 97-127.

Harris, T., M. Lang, and H.P. Moeller, 1994. The value relevance of German accounting measures: An empirical analysis. *Journal of Accounting Research* 32, 187-209.

Harris, T., 1995. International accounting standards versus US-GAAP reporting: empirical evidence based on case studies, Cincinnati OH, International Thompson Press.

Harris, M.S., and K.A. Muller III, 1999. The market valuation of IAS versus US GAAP accounting measures using Form 20-F reconciliations. *Journal of Accounting and economics* 26, 285-312.

Hayn, C., 1995. The Information Content of Losses. *Journal of Accounting and Economics* 20, 125-153.

Joos, P. and M. Lang, 1994. The effects of accounting diversity: Evidence from the European Union, *Journal of Accounting Research*, 32, 141-168.

KPMG, 2000, *Global Financial Reporting, IAS or US GAAP?* European Survey, London.

Leuz, C., 2001. IAS versus US GAAP: A (new) market based comparison. Working Paper, University of Pennsylvania.

Leuz, C. and R.E. Verrecchia, 2000. The economic consequences of increased disclosure, *Journal of Accounting Research*, 38, 91-124.

Securities and Exchange Commission (SEC), 2000. SEC Release No. 33-7801, International accounting standards, February 16.

The Wall Street Journal, 1999. The Outlook, U.S. accounting board faults global rules. October 18.

The Wall Street Journal, 2002. EU to Embrace Accounting Method Not Used in U.S. June 6.

Table 1
Sample Selection Procedure

Panel A: Sample selection procedure

2000 Global Vantage	Number of Firms	Firm-years
Observations with return data and accounting variables covering 12 months for the 1990-2000 period	699	4,323
Observations with fully-consolidated financial statements	628	3,570
Observations with at least two consecutive year observations because of the lagged deflator variable for the independent variable (E) and no missing RET.	464	2,219
Observations excluding the extreme values (top or bottom 1% of distributions of E and RET)	441	2,138[a]
Observations for the three-year period, 1998 – 2000, used in tables 1-5.	416	917

Panel B: Distribution of Stock Exchanges for the 1998-2000 period

Stock Exchange	German GAAP N = 680	IAS N = 158	US GAAP N = 79
Duesseldorf	22	2	2
Frankfurt	617	101	42
Neuer Markt◆	0	50	35
Hamburg	11	3	0
Munich	16	0	0
Stuttgart	8	0	0
Missing	6	2	0

[a] Observations used in table 5 is a subset of 2,138 firm year observations during 1991-2000. (1990 is dropped because we use the beginning market value of equity in deflating the earnings variable).

◆ The list of firms listed in the Neuer Markt is obtained in the website of Deutsche Boerse (www.deutsche-boerse.com) posted as of 11/5/01. Firms listed in the Neuer Markt are coded as listed in the Frankfurt Stock Exchange (Global Vantage Code DEU04). We separated the firms listed in the Neuer Markt sector from the firms coded in the Global Vantage DEU04.

Table 2
Descriptive Statistics

Panel A: Comparison by accounting standards

Variable	German GAAP Mean Median	IAS Mean Median	US GAAP Mean Median	German vs. IAS t-statistic Wilcoxon Z	German vs. US GAAP t-statistic Wilcoxon Z	IAS vs. US GAAP t-statistic Wilcoxon Z
RET	0.00 -0.02	-0.08 -0.05	-0.16 -0.13	1.89* 2.00**	2.61*** 3.70***	1.17 1.59
E	0.04 0.05	0.04 0.04	0.03 0.02	0.61 1.63	2.15** 3.37***	1.47 2.19**
MB	4.84 1.96	3.12 2.02	4.93 2.55	1.73* -0.11	-0.08 -2.00**	-2.35** -1.85*
LEV	0.69[a] 0.72	0.67 [a] 0.71	0.58 [a] 0.60	0.89 0.97	4.39*** 4.18***	3.04*** 2.86***
ASSET	6,560 629	113,533 2,381	40,111 1,124	-4.32*** -4.61***	-3.40*** -2.83***	2.76*** 0.53
MVE	2,242 340	15,675 1,170	23,404 1,380	-4.98*** -6.36***	-3.10*** -6.44***	-1.06 -0.95
N	680	158	79			

Panel B: Comparison by stock exchange

Variable	Non-Neuer Markt Mean Median	Neuer Markt◆ Mean Median	Neuer vs. Non-Neuer Markt t-statistic Wilcoxon Z
RET	0.01 -0.01	-0.41 -0.57	7.12*** 9.42***
E	0.05 0.05	-0.01 0.00	7.34*** 8.37***
MB	4.47 1.96	5.26 2.93	-0.75 -3.25***
LEV	0.70 0.73	0.48 0.48	9.87*** 8.90***
ASSET	30,672 809	575 166	5.93*** 8.30***
MVE	6,965 421	711 327	6.94*** 2.64***
N	832	85	

* (**, ***) Significant at 10% (5%, 1%) level (two-tailed test).
The sample period is, 1998 - 2000.
RET = 12 month buy-and –hold return ending 3 month after the fiscal year end.
E = Income before extraordinary items / beginning market value of equity
ASSET = Total Assets (DM in millions)
MVE = Market value of equity at the end of the fiscal year (closing price * common shares outstanding, DM in millions)
MB = Market value of equity / Total stockholders' Equity
LEV = Total Liability / Asset
◆ The list of firms listed in the Neuer Markt is obtained in the website of Deutsche Boerse (www.deutsche-boerse.com) posted as of 11/5/01. Firms listed in the Neuer Markt are coded as listed in the Frankfurt Stock Exchange (Global Vantage Code DEU04). We separated the firms listed in the Neuer Markt sector from the firms coded in the the Global Vantage DEU04.
[a] The average leverage ratios excluding financial firms (SIC 6000s) are 0.69, 0.62, and 0.55, respectively.

Table 3
Value Relevance of German GAAP-based Earnings vis-à-vis US GAAP and IAS

Panel A: $RET_{it} = \beta_0 + \beta_1 US_{it} + \beta_2 IAS_{it} + \beta_3 E_{it} + \beta_4 E_{it}*US_{it} + \beta_5 E_{it}*IAS_{it} + e_{it}$

Sample	N [a]	β_0 Intercept	β_1 US	β_2 IAS	β_3 E	β_4 E*US	β_5 E*IAS	Adj. R^2 (%)	Test for $\beta_4 = \beta_5$ F-Value P-value
All Firms	680 79 158 917	-0.04 -2.63***	-0.22 -4.74***	-0.15 -4.10***	0.87 7.29***	3.25 4.77***	1.96 4.70***	14.3	2.75* 0.10
Excluding cross-listed firms◆◆	667 57 143 867	-0.04 -2.69***	-0.29 -5.59***	-0.17 -4.58***	0.87 7.50***	3.35 4.45***	1.87 4.59**	15.9	3.13* 0.08

Panel B: $RET_{it} = \beta_0 + \beta_1 US_{it} + \beta_2 IAS_{it} + \beta_3 E_{it} + \beta_4 E_{it}*US_{it} + \beta_5 E_{it}*IAS_{it} + \beta_6 MB_{it} + \beta_7 LEV_{it} + \beta_8 SIZE_{it} + e_{it}$

Sample	N [a]	β_0 Intercept	β_1 US	β_2 IAS	β_3 E	β_4 E*US	β_5 E*IAS	β_6 MB	β_7 LEV	β_8 SIZE	Adj. R^2 (%)	Test for $\beta_4 = \beta_5$ F-Value P-value
All firms	672 78 157 907[b]	-0.17 -3.44***	-0.25 -5.13***	-0.18 -4.75***	0.83 6.58***	2.80 4.03***	1.76 4.19***	0.00 1.54	-0.08 -1.05	0.03 4.08***	15.7	1.77 0.18
Excluding cross-listed firms◆◆	659 57 142 858	-0.16 -3.17***	-0.30 -5.60***	-0.18 -4.90***	0.84 6.82***	3.02 3.94***	1.73 4.20***	0.00 1.41	-0.05 -0.74	0.02 3.26***	16.9	2.35 0.12

Table 3 (Cont'd)

Panel C: $RET_{it} = \beta_0 + \beta_1 US_{it} + \beta_2 IAS_{it} + \beta_3 E_{it} + \beta_4 E_{it}*US_{it} + \beta_5 E_{it}*IAS_{it} + \beta_6 MB_{it} + \beta_7 LEV_{it} + \beta_8 SIZE_{it} + e_{it}$

Sample[c]	N [a]	β_0 Intercept	β_1 US	β_2 IAS	β_3 E	β_4 E*US	β_5 E*IAS	β_6 MB	β_7 LEV	β_8 SIZE	Adj. R^2 (%)	Test for $\beta_4 = \beta_5$ F-Value P-value
Small Firms	354 34 65 453	-0.09 -0.79	-0.27 -3.83***	-0.22 -4.34***	0.91 5.15***	5.53 3.84***	1.53 3.05***	0.00 0.66	0.06 0.63	-0.00 -0.09	18.9	7.04*** 0.00
Large Firms	318 44 92 454	-0.09 -0.92	-0.22 -3.16***	-0.13 -1.78*	0.87 4.70***	2.13 2.55***	1.53 1.62	0.02 4.30***	-0.33 -2.73***	0.03 2.98***	12.7	0.24 0.62

Panel D: $RET_{it} = \beta_0 + \beta_1 US_{it} + \beta_2 IAS_{it} + \beta_3 E_{it} + \beta_4 E_{it}*US_{it} + \beta_5 E_{it}*IAS_{it} + \beta_6 MB_{it} + \beta_7 LEV_{it} + \beta_8 SIZE_{it} + e_{it}$

Sample	N [a]	β_0 Intercept	β_1 US	β_2 IAS	β_3 E	β_4 E*US	β_5 E*IAS	β_6 MB	β_7 LEV	β_8 SIZE	Adj. R^2 (%)	Test for $\beta_4 = \beta_5$ F-Value P-value
Profit Obs. (E ≥ 0)	570 54 131 755	-0.17 -3.18***	-0.18 -2.40**	-0.14 -2.81***	1.21 6.22***	1.74 1.78*	1.37 2.45**	0.00 2.50**	-0.12 -1.53	0.03 3.90***	10.1	0.12 0.73
Loss Obs. (E < 0)	102 24 26 152	-0.38 -2.17**	-0.14 -0.93	-0.23 -1.73*	-0.05 -0.17	3.54 1.34	0.64 0.50	0.00 0.60	-0.03 -0.15	0.03 1.23	6.3	1.00 0.32

* (**, ***) Significant at 10% (5%, 1%) level (two-tailed test).
The sample period is, 1998 - 2000.
[a] Numbers of firm-year observations for German GAAP, US GAAP, IAS, and total.
[b] Ten observations have missing MB due to negative stockholders' equity.
[c] Firms are classified into tow groups, above and below sample's yearly firm-size median, using the Total Assets each year.
◆◆ Cross-listed in the London Stock Exchange (as of 9/28/01), NYSE (as of 10/26/01), or NASDAQ (as of 8/31/01). No German firms are listed in the AMEX as of 2/05/01.

RET = 12 month buy-and –hold return ending 3 month after the fiscal year end.
E = Income before extraordinary items / beginning market value of equity.
US = 1 if US GAAP is used, 0 otherwise.
IAS = 1 if IAS is used, 0 otherwise.
MB = Market value of equity / Total stockholders' Equity.
LEV = Total Liability / Asset.
SIZE = Natural logarithm of Total Assets.

Table 4
Value Relevance of German GAAP-based Earnings vis-à-vis US GAAP and IAS:
Neuer Markt vs. Non-Neuer Markt Firms

Model: $RET_{it} = \beta_0 + \beta_1 NEU_{it} + \beta_2 E_{it} + \beta_3 E_{it}*US_{it} + \beta_4 E_{it}*US_{it}*NEU_{it} + \beta_5 E_{it}*IAS_{it} + \beta_6 E_{it}*IAS_{it}*NEU_{it} + e_{it}$

Sample	N [a]	β_0 Intercept	β_1 NEU	β_2 E	β_3 E*US	β_4 E*US*NEU	β_5 E*IAS	β_6 E*IAS*NEU	Adj. R^2 (%)	Test for $\beta_3 = \beta_5$ F-Value P-value	Test for $\beta_3 + \beta_4 = \beta_5 + \beta_6$ F-Value P-value
All Firms	680 79 (35) 158 (50) 917 (85)	-0.04 -2.77***	-0.34 -8.17***	0.87 7.48***	0.66 0.93	4.02 2.86***	0.86 2.16**	0.97 1.05	18.1	0.06 0.81	3.79** 0.05
Excluding cross-listed firms◆◆	667 57 (31) 143 (50) 867 (81)	-0.04 -3.09***	-0.34 -8.04***	0.88 .73***	0.41 0.49	4.23 2.72***	0.74 1.84*	1.07 1.18	18.7	0.12 0.73	3.40* 0.07

* (**, ***) Significant at 10% (5%, 1%) level (two-tailed test).
The sample period is, 1998 - 2000.
[a] Numbers of firm-year observations for German GAAP, US GAAP, IAS, and total. (Number of observations for Neuer Markt firms is in parentheses).
RET = 12 month buy-and –hold return ending 3 month after the fiscal year end.
E = Income before extraordinary items / beginning market value of equity.
US = 1 if US GAAP is used, 0 otherwise.
IAS = 1 if IAS is used, 0 otherwise.
IASUS = 1 if US GAAP or IAS is used, 0 otherwise.
NEU = 1 if firms are listed in the Neuer Markt, 0 otherwise.
◆◆ Cross-listed in the London Stock Exchange (as of 9/28/01), NYSE (as of 10/26/01), or NASDAQ (as of 8/31/01). No German firms are listed in the AMEX as of 2/05/01.

Table 5
Switching Effect from German GAAP to US GAAP or IAS

Model: $RET_{it} = \beta_0 + \beta_1 POST_{it} + \beta_2 E_{it} + \beta_3 E_{it} * POST_{it} + e_{it}$

Panel A: Firms Switching Accounting Standard to either US GAAP or IAS and the Control Groups

Sample	# of Obs.	# of Firms	β_0 Intercept	β_1 POST	β_2 E	β_3 E*POST	Adj. R^2 (%)
Standard-Change to U.S. GAAP or IAS	322	37	0.13 4.75***	-0.14 -2.68***	0.31 1.05	1.97 3.28***	5.1
Standard –Change to U.S. GAAP or IAS excluding Cross-Listed firms◆◆	236	28	0.11 3.76***	-0.16 -2.89***	0.42 1.39	1.86 3.16***	7.8
Industry-Matched Control Sample	301	37	0.05 2.33**	-0.00 -0.10	1.02 5.32***	0.48 1.25	13.5
Size-Matched Control Sample	314	37	0.07 3.33***	-0.07 -1.69*	0.91 4.08***	-0.03 -0.07	6.4

Panel B: Firms Switching Accounting Standard to US GAAP

Sample	# of Obs.	# of Firms	β_0 Intercept	β_1 POST	β_2 E	β_3 E*POST	Adj. R^2 (%)
Standard-Change to U.S. GAAP	106	13	0.14 2.23**	-0.30 -2.35**	0.44 0.58	3.82 2.36**	5.9
Standard-Change to U.S. GAAP excluding Cross-listed firms◆◆	68	9	-0.00 -0.07	-0.30 -2.19*	2.15 1.98*	4.06 2.08**	20.6

Panel C: Firms Switching Accounting Standard to IAS

Sample	# of Obs.	# of Firms	β_0 Intercept	β_1 POST	β_2 E	β_3 E*POST	Adj. R^2 (%)
Standard-Change to IAS	216	24	0.12 4.29***	-0.10 -1.69	0.28 0.92	1.53 2.54**	4.5
Standard-Change to IAS excluding Cross-listed firms◆◆	168	19	0.11 3.73***	-0.11 -1.82*	0.26 0.85	1.51 2.50**	5.2

* (**, ***) Significant at 10% (5%, 1%) level (two-tailed test).
The sample period is, 1991 - 2000. This sub-sample does not include firms in the Neuer Markt because only US GAAP or IAS is allowed in the Neuer Markt.
RET = 12 month buy-and –hold return ending 3 month after the fiscal year end.
E = Income before extraordinary items / beginning market value of equity
POST = 1 if firm-year observations are from the post-standard-change period including the change year, 0 otherwise.
◆◆ Cross-listed in the London Stock Exchange (as of 9/28/01), NYSE (as of 10/26/01), or NASDAQ (as of 8/31/01). No German firms are listed in the AMEX as of 2/05/01.