

# The Market Valuation Of Earnings In Germany, The United Kingdom And The United States

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## ABSTRACT

*This paper examines a short-term market reaction to unexpected earnings in the United Kingdom, Germany, and the United States. The results indicate that all three markets react quickly to earnings releases. Further, when changes in analysts' forecasts are used as an indication of updated earnings expectations, all three markets respond as well. Thus, it appears that investors in both countries react to the release of unexpected earnings in a similar manner. We also examine the incremental explanatory power of analysts' forecast errors over the change in earnings per share. As all three countries have well developed stock markets, investors are likely to formulate earnings expectations based on a wide range of financial and non-financial information, including analysts' forecasts. Regression results indicate that in Germany, the UK and the US, both analysts' forecasts and earnings announcements are jointly associated with market returns suggesting that the analysts provide information incremental to that provided in earnings releases.*

## INTRODUCTION

In recent years, the global economy has become a reality. The European Union (EU) now requires publicly traded EU companies to comply with international accounting standards of the IASB. Recent accounting scandals in the U.S. have also increased the momentum to establish international standards that are based on principles and that increase transparency (Barker 2003; Zizzo 2003). Understanding differences in international accounting practices and evaluating how the existing financial reports are utilized by markets can provide insight into which standards the IASB should adopt to achieve their goal of transparency in the financial markets.

Previous international accounting research has examined how differences in accounting practices affect firm valuation.<sup>1</sup> This paper examines a relatively short-term market reaction to unexpected earnings defined by both change in earnings and analysts' forecast errors in Germany, the United Kingdom (UK) and the United States (US). Differences in accounting standards, enforcement of the standards, stock market characteristics and culture may cause differences in market responses to earnings releases. We first explore key similarities and differences between the accounting standards of the three countries. We then develop hypotheses to examine whether accounting differences, in conjunction with culture and market characteristics, lead to varying market reactions to earnings announcements and market participants' expectations of current year's earnings.

An extensive amount of research examines the earnings-returns relationship. Early research attempted to identify a relationship between earnings and returns in a single country. Specifically, this research attempts to identify price changes around the release of financial statements and/or earnings information. Ball and Brown (1968) were the first to confirm the relationship between returns and earnings using data from the U.S. Similar analysis has been conducted in several foreign countries, with results typically consistent with those in the U.S.<sup>2</sup> Recent international accounting research attempts to identify cross-country differences in the value relevance of earnings announcements.<sup>3</sup> Though value relevance

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is examined using various methodologies, a consistent component of these studies is a comparison of the estimated coefficients and explanatory power of the association between earnings and returns. The results generally show significant differences in the estimated coefficients and explanatory power of the earnings-returns relationship across countries. Myring (2006) extends those studies by examining the impact of EPS and analysts' forecast errors on returns in various accounting regimes. His research shows that investors in more developed countries use information from prior earnings as well as analysts' forecasts whereas less developed countries tend to rely only on prior earnings.

Using data from 1987 to 1998, we test the existence of a short-term market reaction to the release of earnings in the three countries. The results from this hypothesis indicate that markets in Germany, the UK, and the US all react relatively quickly to earnings releases. Further, when changes in analysts' forecasts are used as an indication of updated earnings expectations, all three markets respond as well. Thus, it appears that investors in all three countries react to the release of unexpected earnings in a similar manner. The second hypothesis provides more insight into the information utilized by the markets by examining the incremental explanatory power of analysts' forecast errors over the change in earnings per share. As all three countries have well developed stock markets, investors are likely to formulate earnings expectations based on a wide range of financial and non-financial information, including analysts' forecasts. Thus, we posit that both the change in earnings per share and analysts' forecast errors will provide information to the market. The results from this hypothesis conform to expectations. In Germany, the UK and the US, both pieces of information are associated with market returns suggesting that the analysts provide information incremental to that provided in earnings releases.

## **COMPARISON OF ACCOUNTING STANDARDS**

The International Accounting Standards Board (IASB) has a vision of accounting standards harmonization among all developed countries in the world. This goal seems idealistic based on the current state of international accounting. Specifically, the US, the UK and Germany, prominent players in the global economy, are dissimilar in many of their accounting policies and procedures. These differences occur because of the varying perspectives of standard setters in those three countries. For example, in the United States, the FASB focus is on meeting the interest of investors. In the United Kingdom, however, standards are expected to satisfy the objectives of both investors and other interest groups (e.g. creditors). Meanwhile, German standards primarily focus on the informational requirements of creditors, and governments rely on financial reports to establish taxable income. As a result, there are substantial differences in reporting requirements across the three countries as the standard setters in each country attempt to satisfy unique groups of users. (Radebaugh and Gray 2002).

### **Accounting For Taxes**

Because of the varying reporting focal points, distinct differences occur when accounting for taxes. In the US, financial accounting rules are established primarily for the investment community while tax laws are established by governments to determine amounts payable as tax. To adjust for these differences, SFAS 109 requires US corporations to record deferred tax assets and liabilities for temporary differences arising between the two standards systems. The UK has similar reporting requirements as deferred tax assets and liabilities are recognized if the transaction results in differences in future taxes owed (FRS 19). The UK system may be deemed a partial deferral system as certain conditions involving non-monetary assets are not deferred. The US and UK tax standards are dramatically different from German standards. As previously discussed, Germany's financial statements are used as the basis for taxation. As a result, German accounting rules tend to encourage companies to under-value assets and over-value liabilities to reduce their earnings and, ultimately, decrease their tax liability (Glaum 2000).

### **Accounting For Reserves**

The accounting methods for reserves, such as contingent liabilities, vary greatly across the three countries because of the reporting focus of financial statements. In Germany, where financial statements are primarily focused on protecting creditors, the accounting rules for losses are more conservative than in the US or the UK. German companies are required to recognize a loss on their income statements and to record a liability if the loss is reasonably possible. In the US,

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however, the contingent loss is not recognized until it is probable (Iqbal 2002). Further, German standards permit "expense liability reserves" as a method of smoothing earnings. In particular, when a company has a very successful year, they record extra expenses. These expenses are then removed during economic slumps. As an example, when Daimler-Benz first listed on the New York Stock Exchange in 1993, the annual report revealed \$2.45 billion in hidden reserves (Iqbal 2002, pg. 149). Neither the US nor the UK promote the use of reserves for income smoothing.

### **Accounting For Goodwill**

The reporting requirements for purchased goodwill were very similar in the US and the UK through June 2001 (*APB No. 17* and *FRS10*). In particular, both countries required purchased goodwill to be amortized on a straight-line basis over the periods benefited. In the UK, goodwill is amortized over a self-determined time frame (frequently 20 years) while the US does not require goodwill amortization. Further, in both countries, the value of purchased goodwill was written down if there was a significant impairment of value.<sup>4</sup> German standards actually permit two treatments for goodwill. Under the first EU treatment companies capitalize and amortize goodwill over its expected useful life which must range from 5-15 years. This treatment is similar to UK standards. German companies, however, may elect to "charge" goodwill against stockholders' equity. From a corporate perspective, this is probably an ideal choice as they can elect to write-off goodwill without reducing current or future earnings (Radebaugh and Gray 2002).

### **Accounting For Depreciable Assets**

Reporting requirements for long-lived assets are mixed among the three countries. In the both the US and Germany, long-lived tangible assets are recorded at historical cost. In the UK, however, assets are periodically revalued with losses recorded against income and gains recorded in shareholders' equity. (Radebaugh and Gray 2002). Despite their differences in recording the value of the asset, the UK and US utilize similar methods for depreciating long-lived assets while German companies diverge. Specifically, US and UK standards require companies to select the depreciation method that best reflects the anticipated depreciation of the asset. In both countries, the straight-line method of depreciation is dominant (Iqbal 2002). German companies, on the other hand, primarily utilize a reducing balance method that is similar to the Modified Accelerated Cost Recovery System that may be applied for US income taxes. This results in lower net income and lower taxes in the early years of an assets life.

### **Accounting For Research and Development**

In most instances, the UK and the US standards are more similar than German standards. However, when accounting for research and development expenses, this is not the case. In the US, *SFAS 2* requires that all research and development costs must be expensed when incurred. German standards also require research and development costs to be expensed when incurred (Iqbal 2002). Standard setters in both countries argue that these costs should be expensed as future benefits from R&D are uncertain and reliable estimates of value are not possible (Freeburn 1998). In the UK, meanwhile, research costs are expensed immediately but development costs are capitalized (Radebaugh and Gray 2002). This difference can have a substantial impact on the financial statements of US, German, and UK companies. For example, in 2001 Eli Lilly, a U.S. pharmaceutical company, spent \$2.2 billion on research and development, almost equaling their net income of \$2.8 billion. Thus, in order to consistently compare a UK pharmaceutical to a US pharmaceutical, an investor would need to make an adjustment for the development portion of R&D.

## **HYPOTHESES DEVELOPMENT**

We develop two hypotheses to explore market reactions to earnings and analysts' forecasts in the US, the UK and German. The first hypothesis examines the existence of a short-term market reaction to the release of earnings. Previous research has documented a market reaction to the release of earnings information in the U.S. and other countries. However, there are several potential reasons for lack of a relatively short-term reaction to an earnings announcement. First, accounting information may be of low quality and, thus, viewed as value irrelevant. In addition, firm-specific characteristics and macro economic conditions have been shown to cause variation in the market reaction to the release of

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earnings in the US and thus may cause international variation in the market reaction to the release of earnings. Further, it is likely that the enforcement of standards differs across countries. Finally, investors may not possess equal access to financial and non-financial information and may process available information with varying degrees of efficiency. An extreme form of any of these conditions (or a combination of conditions) may cause the lack of a market response to earnings announcements.

Conditions also may exist that cause the market not to react to unexpected earnings announcements in the short-term even though a reaction may exist in the long-term. Cultural differences may result in differences in investors' behavior. For example, investors in some countries may possess a long-term perspective when making investing decisions and react only to long-term changes in profitability. In this case, there would be little short-term market reaction to an unexpected earnings announcement but a long-term market reaction may exist. Because of the quality of accounting standards and degree of market sophistication, we expect markets to react to the release of unexpected earnings in all three countries:

**H1:** *A relatively short-term market reaction to the release of unexpected earnings will exist in the US, the UK, and Germany.*

The second hypothesis provides a more detailed exploration of the information used by investors when forming earnings expectations. Previous research in the US has primarily used two proxies for market participants' earnings expectations: prior year's earnings and mean analysts' forecasts. Using prior year's earnings as a proxy for earnings expectations implies that market participants base their expectation of current year's earnings on the prior year's earnings alone. The use of analysts' forecasts as proxies for earnings expectations assumes that market participants have access to analysts' forecasts of earnings and incorporate such information into earnings expectations or, alternatively, have access to the same information as analysts and process it in a similar manner.

Assuming that the market reacts to the release of information, three potential outcomes are possible: (1) the market may react to earnings information as defined by a change in EPS, (2) the market may react to earnings information as defined by analysts' forecast errors, or (3) the market may react to earnings information as defined by both the change in EPS and analysts' forecast errors. A significant reaction to change in EPS alone indicates that accounting information is value relevant and that investors base their expectations of current year's earnings on past earnings rather than analysts' forecasts.

A market reaction to unexpected earnings as defined by analysts' forecast errors but not changes in EPS is likely to result if investor expectations are approximated by analysts' forecasts. This may occur in highly developed markets where investors are well informed and new information is reflected in stock prices quickly. In such cases, few investors view the prior year's actual earnings as the sole criterion for developing expectations of the current year's earnings. A market reaction to both measures of unexpected earnings is likely to occur when market expectations of current year's earnings are based on both the prior year's earnings and analysts' forecasts. Thus, this situation can occur in developed markets where forecast information is readily available, but less efficiently reflected in stock prices. Because investors in the US, the UK, and Germany are sophisticated and accounting standards are well developed, we expect investors to use a combination of financial and non-financial information (including analysts' forecasts) to form earnings expectations. In addition, we expect investors to react when earnings deviate from expectations. This leads to the second hypothesis:

**H2:** *The information content of analysts' forecast errors will provide incremental information to the change in EPS in the US, the UK, and German markets.*

## **DATA AND DESCRIPTIVE STATISTICS**

The preliminary sample used in this study is selected based on data available from the Institutional Brokers Estimation System (I/B/E/S) database. Table 1, Panel A, reports that 76,617 observations were available for the three countries between 1987 and 1998. Of those observations, 29,722 had monthly stock prices and dividends on Compustat Global Vantage (GV) database. Thus, the final sample used in this analysis consists of a total of 29,722 firm-years (4,479

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companies) from the three countries. To reduce the effect of extreme observations, each variable used in the analysis is winsorized at five percent.

**Table 1:  
Sample Selection Procedure Partitioned by Countries**

<b>Panel A: Firm-Years</b>			
<b>Country</b>	<b>Total Firm-Year Observations Available from I/B/E/S</b>	<b>Less: Firm Years Not Available on Global Vantage</b>	<b>Total Firm-Years Observations in Final Sample</b>
German	4,451	(2,207)	2,244
U.K.	14,645	(6,612)	8,033
U.S.	<u>57,521</u>	<u>(38,076)</u>	<u>19,445</u>
Total	76,617	(46,895)	29,722

  

<b>Panel B: Companies</b>			
<b>Country</b>	<b>Total Companies I/B/E/S</b>	<b>Less: Companies on Global Vantage</b>	<b>Total Companies in Final Sample</b>
Germany	837	(422)	415
U.K.	2,734	(1,512)	1,222
U.S.	<u>13,702</u>	<u>(10,840)</u>	<u>2,862</u>
Total	17,273	(12,774)	4,479

Descriptive statistics are presented in Table 2. These statistics are based on the winsorized sample. Mean and median excess returns are positive for all three countries. The mean and median change in earnings per share (CEPS) is also positive for each of the countries. Mean analysts' forecast errors are negative in all three countries indicating that analysts, on average, are overly optimistic in forecasting earnings. Interestingly, the median forecasts errors are almost zero in both the US and Germany but are positive in the UK. Thus, in the UK it appears that some analysts are very optimistic resulting in a mean negative forecasts error.; however, the majority of analysts in the UK are pessimistic.

**Table 2:  
Pooled Cross-Sectional Descriptive Statistics for Dependent and Independent  
Variables Partitioned by Countries, 1987-1998**

<b>Country</b>	<b>Mean</b>	<b>Median</b>	<b>St. Dev.</b>	<b>1<sup>st</sup> Quartile</b>	<b>3<sup>rd</sup> Quartile</b>
Germany (n=2,244)					
Excess Return	0.009	0.002	0.064	-0.034	0.046
CEPS	0.002	0.002	0.033	-0.007	0.012
AFE	-0.003	0.000	0.012	-0.004	0.002
United Kingdom (n=8,033)					
Excess Return	0.022	0.014	0.076	-0.029	0.067
CEPS	0.002	0.007	0.033	-0.006	0.016
AFE	-0.001	0.001	0.009	-0.002	0.003
U.S. (n=19,445)					
Excess Return	0.013	0.006	0.091	-0.049	0.068
CEPS	0.002	0.006	0.039	-0.008	0.017
AFE	-0.003	0.000	0.013	-0.003	0.002

Excess Returns = One-month excess returns during the month of earnings release.  
 CEPS = Change in annual earnings per share between time  $\tau$  and  $\tau-1$  deflated by price.  
 AFE = Actual I/B/E/S annual earnings per share less I/B/E/S forecast annual EPS deflated by price.

## TESTS OF HYPOTHESES

The first hypothesis examines the existence of a market response to the release of earnings information. H1 is tested using two models. In the first model, one-month excess returns are regressed on the change in EPS as shown below:

$$ER_{j,t} = \alpha_0 + \alpha_1 CEPS_{j\tau} + e_{j,t} \quad (1)$$

Where  $ER_{j,t}$  = excess returns for firm  $j$  and time  $t$   
 $CEPS_{j\tau}$  = change in EPS for firm  $j$  and year  $\tau$  deflated by price, and  
 $e_{j,t}$  = regression error term for company  $j$  and year  $\tau$ .

Excess returns are calculated using the market-adjusted model for the month of the earnings release.<sup>5</sup> The market return is the return on an equally weighted portfolio of stocks in the market. This methodology implicitly assumes that all firms' betas are constant and equal to one.<sup>6</sup>

Alternatively, H1 is tested using a similar model in which excess returns are regressed on analysts' forecast errors.

This regression is shown in the following equation:

$$ER_{j,t} = \beta_0 + \beta_1 AFE_{j\tau} + \mu_{j\tau} \quad (2)$$

where  $AFE_{j\tau}$  = analysts' forecast error for company  $j$  and year  $\tau$  deflated by price, and  
 $\mu_{j\tau}$  = regression error term for company  $j$  and year  $\tau$ .

$AFE_{j\tau}$  is calculated using the mean consensus forecast of annual earnings. Specifically, the most recent consensus forecast prior to an earnings announcement release date is used. H1 is tested by estimating equations (1) and (2) for Germany, the UK, and the US. If either  $\alpha_1$  or  $\beta_1$  is significant, there is a market reaction to the release of accounting earnings and H1 is supported. Support of H1 indicates that accounting information is value relevant to investors and that there is a reaction to the announcement of earnings that does not conform with expectations.

The results of the two initial regressions testing H1 are presented in Table 3.<sup>7</sup> The CEPS regressions reveal a positive and significant relationship between CEPS and excess returns in all three countries. The coefficient on CEPS for both Germany and the UK is approximately 0.14 and is significant at less than 0.01. For the US, the coefficient increases to 0.233 and is also significant at the 0.01. Thus, there is a market reaction to the release of unexpected accounting earnings defined by CEPS. These results support H1 and indicate that investors in the countries evaluated view accounting information as value relevant. In essence, when expected earnings and reported earnings do not equal, investors react. It is interesting to note that the adjusted  $R^2$  for the U.S. is nearly twice as large as the German and UK adjusted  $R^2$ . This suggests that accounting information is relied on more heavily in the US than in the European countries.

H1 is also tested using an alternate measure of unexpected earnings, AFE. The results of the AFE regression also reveal a relationship between unexpected earnings and returns in the selected countries. As with CEPS, the coefficients for the AFE variable are positive and significant. The coefficients on these variables are higher than the CEPS regression coefficients, ranging from 0.413 in the UK to 0.598 in the US. This indicates that investors in all three countries incorporate analysts' forecasts into earnings expectations. In addition, when actual earnings do not conform to expectations, investors react. This provides additional evidence that investors view accounting information as value relevant in the investigated countries. In sum, the results of these two regressions reveal a significant reaction to the release of unexpected earnings and lead to the support of H1. The similarity in market reaction to the release of earnings is

likely the result of the similarity in their accounting standards and market development.

H2 examines the incremental explanatory power of AFE as a proxy for market participants’ earnings expectations over CEPS. This hypothesis examines the nature of the information obtained by investors in formation of earnings expectations, and/or the efficiency and effectiveness with which it is processed. Tests of incremental information content are used to determine whether analysts’ forecast errors are associated with excess returns after the effect of change in EPS has been removed. This is accomplished through a regression of excess returns on the two measures of unexpected earnings: the change in annual EPS and analysts’ forecast errors as shown in the following equation:

$$ER_{jt} = \varphi_0 + \varphi_1 AFE_{jt} + \varphi_2 CEPS_{jt} + \omega_{jt} \tag{3}$$

where  $\omega_{jt}$  = regression error term for company j at year  $\tau$ .

H2, involving the incremental information content of analysts’ forecast errors, is tested by estimating equation (3) using data pooled by each country. Analysts’ forecast errors possess incremental information content over the change in EPS if  $\varphi_1$  is significant. More specifically, if  $\varphi_1$  is significant and  $\varphi_2$  is not, then analysts’ forecasts have explanatory power, suggesting that analysts’ forecasts approximate market participants’ expectations of current year’s earnings. If  $\varphi_1$  and  $\varphi_2$  are significant, change in EPS has incremental explanatory power over analysts’ forecast errors and analysts’ forecast errors have incremental explanatory power over change in EPS. Results of the regression of excess returns on AFE and CEPS are presented in Table 3. CEPS and AFE are jointly significant in the three countries. This result suggests that analysts’ forecasts, or other information available to investors, provide incremental explanatory power to earnings changes. This implies that market participants use a combination of prior year’s earnings and analysts’ forecasts to form earnings expectations. The results of this test are reflective of a relatively high degree of investor sophistication in the three countries that are examined. Investors appear to incorporate a combination of earnings and other financial and non-financial information (including analysts’ forecasts) into earnings expectations.

**Table 3:**  
**Pooled Cross-Sectional Regressions of Mean-Adjusted Returns on Change in Earnings Per Share and Analysts’ Forecast Errors Partitioned by Countries**

Estimated Coefficients:				
Country	CEPS	AFE	Adj. R <sup>2</sup>	F-value
Germany (n=2,244)	0.144 (3.37)*		0.0060	14.5*
		0.521 (4.13)*	0.0096	10.6*
	0.171 (4.03)*	0.586 (4.60)*	0.0181	21.6*
U.K. (n=8,033)	0.145 (5.53)*		0.0051	42.4*
		0.413 (4.77)*	0.0039	32.3*
	0.131 (4.95)*	0.360 (4.13)*	0.0080	33.3*
U.S. (n=19,445)	0.233 (12.6)*		0.0103	202.7*
		0.598 (10.6)*	0.0076	149.6*
	0.219 (11.8)*	0.548 (9.70)*	0.0166	165.1*

Excess Returns = One-month excess returns during the month of earnings release.

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CEPS = Change in annual earnings per share between time  $\tau$  and  $\tau-1$  deflated by price.  
AFE = Actual I/B/E/S annual earnings per share less I/B/E/S forecast annual EPS deflated by price.

\*significant at  $p < 0.01$ .

In sum, the results of this study reveal a degree of similarity in the market reaction to the release of earnings in Germany, the UK, and the US. Specifically, the results indicate that there is a market reaction to the release of earnings. Thus, accounting information is value relevant and the market reacts to earnings that do not conform to expectations. In addition, analysts' forecast errors provide incremental information in explaining returns. Specifically, investors appear to incorporate analysts' forecasts in earnings expectations.

## SUMMARY AND CONCLUSION

The purpose of this study was to examine the relatively short-term market reaction to unexpected earnings in Germany, the UK, and the U.S. Differences in accounting standards, stock market characteristics and culture may cause differences in market responses to earnings releases. We first explored key similarities and differences between the accounting standards of the two countries. A series of hypotheses were developed to examine whether accounting differences, in conjunction with culture and market characteristics, lead to varying market reactions to earnings announcements and market participants' expectations of current year's earnings.

The results show that markets of all three countries react to unexpected earnings defined by both the change in prior year earnings and analysts' forecast errors. This suggests that accounting information is value relevant to investors in the three countries. We then document that analysts' forecast errors provide information that is incremental to the change in earnings. Specifically, we regressed analysts' forecast errors and the change in earnings per share on excess returns. The coefficients on both variables are significant. Thus, market participants use accounting earnings and other information to form earnings expectations.

This paper contributes to prior literature in several ways. First, most international literature examines a long-term reaction to earnings announcements. This paper examines excess returns surrounding the month of the earnings release. In addition, we provide evidence on the market reaction to both the change in accounting earnings and to analyst's forecast errors. This research also documents that accounting earnings and analyst's forecast errors provide incremental information to each other. Thus, market participants in the evaluated countries rely on both financial and non-financial information when forming expectations about companies in which to invest.

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## END NOTES

<sup>1</sup> See, for example, Amir et al. (1993) and Barth and Clinch (1998).

<sup>2</sup> See, for example, Kubota (1980) for Japan; O'Hanlon, Poon and Yaansah (1992) for the U.K.; Emanuel (1984) for New Zealand; Abdelsalam and Satin (1988) for Saudi Arabia; Ballester and Livnat (1997) for Spain; Cheung and Sami (2000) for Hong Kong and Hodgson and Stevenson-Clarke (2000) for Australia..

<sup>3</sup> See, for example, Alford et al. (1993), Harris et al. (1994), Frost and Pownall (1994), Joos and Lang (1994), Ali and Hwang (2000).

<sup>4</sup> In the U.S., SFAS 142 became effective for all purchased goodwill after July 2001. Under *SFAS 142*, goodwill has an indefinite useful life and thus is not amortized. Instead, goodwill is examined annually for impairment.

<sup>5</sup> Only the monthly stock prices are available from GV. Thus, because announcement dates vary within months, the pre-earnings announcement and post-earnings announcement periods vary across firms.

<sup>6</sup> This method is used due to limited data on commercial databases. Specifically, only monthly price data is available. Thus, there is insufficient data to calculate betas for each firm. Therefore, all betas are assumed to equal one. Brown and

Warner (1980) provide support for this method, concluding the test using risk adjusted returns are no more powerful than tests using returns that had not been adjusted for systematic risk in tests using monthly data.

<sup>7</sup> All t-statistics for pooled data have been adjusted for heteroskedasticity using the method suggested by White (1980).

**NOTES**