The Declining Value Relevance of Accounting Information and Non-Information-Based Trading: An Empirical Analysis*

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Abstract

Recently, a growing body of literature has suggested that financial statements have lost their value relevance because of a shift from a traditional capital-intensive economy to a high-technology, service-oriented economy. These conclusions are based on studies that find a temporal decline in the association between stock prices and accounting information (earnings and book values). This paper empirically tests a theoretical prediction arising from the Noisy Rational Expectations Equilibrium model that suggests that the decline could be driven by non-information-based (*NIB*) trading activity, because such trading reduces the ability of stock prices to reflect accounting information. Specifically, Dontoh et al. (2004) show that when *NIB* trading increases, the *R-squares* of a regression of stock price on accounting information declines. Our empirical tests confirm this prediction; i.e., the decline in the association between stock prices and accounting information as measured by *R-squares* is driven by an increase in *NIB* trading.

Keywords Noisy rational expectations equilibrium; Non-information-based trading; Value relevance

JEL Descriptors D82, G14, M41

1. Introduction

Recent literature has created a widespread impression that financial statements have lost their value relevance because of a shift from traditional capital-intensive economy into a high technology, service-oriented economy. In particular, it is claimed that financial statements are less relevant in assessing the fundamental value of high-technology, service-oriented firms, which are by nature knowledge-intensive (see, for example, Elliott and Jacobsen, 1991; Jenkins, 1994; and Sever and Boisclaire, 1990). Ramesh and Thiagarajan (1995), Chiang and Venkatesh (1998), Lev and Zarowin (1999), Francis and Schipper (1999) and Brown et al. (1999) find a decline in the value relevance of accounting information over time. These studies examine the association between a combination of earnings, change in earnings and book value and contemporaneous stock prices or returns. The authors of these studies generally view the *R-squares* or coefficients on the explanatory variables in these regressions as a reflection of value relevance. An exception to these findings is provided by Collins et al. (1997), who show that when book values are added as an additional independent variable along with earnings, the value relevance holds steady or improves over time. They also find that the incremental value relevance of earnings (book value) declines (increases) in the frequency of non-recurring items and negative earnings, suggesting that claims that the conventional historical cost accounting model has lost its value relevance are premature. Brown et al. (1999), however, argue that a scale factor common to price per share, *EPS*, and book value per share induces a spurious increase in value relevance over time. After controlling for the scale, they find that incremental value relevance of both earnings and book value has in fact declined over time. An assumption implicit in these studies is that the process by which the contemporaneous stock price reflects value relevant information (both accounting and non-accounting) remains unchanged over time.

In this paper, we investigate the effect of trading activity for reasons other than revisions in investor beliefs about the fundamental value of the stock on the decline in the R-square of the regression of stock price on accounting information. We refer to such trading as non-information-based (*NIB*) trading.[1] We empirically examine the declining association between stock price and accounting information over

time and its relationship to non-information-based (*NIB*) trading using the theoretical prediction of the Noisy Rational Expectations Equilibrium model in Dontoh et al. (2004). Dontoh et al. (2004) show that when *NIB* trading increases, the R-square obtained from a regression of stock price on accounting information decreases.

The intuition for the theoretical prediction is based on the observation that *NIB* trading injects noise into stock prices. If the accounting variables were to reflect nothing but information about changes in fundamental value, and no other data provided such information, the association between the accounting variables and fundamental value would be perfect. *NIB*-trading, however, moves prices away from the security's fundamental value - the value conditional on value relevant information such as earnings and book value of equity. It follows that increased *NIB* trading injects increased noise in stock prices and thereby reduces the observed association between stock prices and value relevant accounting information. If, over time, the degree to which prices deviated from value increased because of increased noise injected by *NIB* trading, the R-square measured using stock prices as dependent variables would correspondingly decline. Thus, the observed temporal decline in *R-squares* may have resulted from increased *NIB* trading rather than, or in addition to, other factors.

To empirically investigate this theoretical prediction, we regress stock prices on earnings and book values, seen as encapsulating accounting information and thus obtain the annual *R-squares*. Consistent with earlier studies, we find that the *R-squares* have declined over time. We estimate the proxy for *NIB* trading activity by regressing the daily trading volume (scaled by outstanding shares) on the moments of the distribution of analysts' forecast revisions annually and using the sum of the estimated intercept and the residual as the proxy for the average daily *NIB* trading volume each year. Our estimate of *NIB* trading is increasing over time. Consistent with the theoretical prediction, we find that the *R-squares* obtained by regressing stock prices on earnings and book values is negatively associated with our *NIB* trading proxy, suggesting that increased *NIB* trading could be responsible for the decline in *R-squares* over time. Moreover, we find that this negative association is more pronounced for the highly intangible-intensive (market-to-book ratio) firms, suggesting that the decline in *R-squares* of the regression of stock price on

accounting information is attributable to a large extent to *NIB* trading rather than to the inadequacy of accounting information for such glamour firms.

2. NIB Trading and Value Relevance

Hypothesis and Research Design

As discussed above, *NIB* trading injects noise into stock prices and, consequently, weakens the observed association between stock prices and value relevant accounting information (see Dontoh et al., 2004). Intuitively, *NIB*-generated noise moves prices away from the security's fundamental value—the value conditioned on value relevant information such as book value and earnings. Hence, if the degree to which prices deviate from value intensified over time because of increased noise injected by *NIB* trading, the R-square measured using stock-price-based dependent variables would correspondingly decline over time.[2] Our hypothesis is based on the theoretical prediction contained in Dontoh et al. (2004), which is summarized below.[3]

HYPOTHESIS *The decline in the association between stock price and accounting information as measured by the R-squares is positively associated with increased non-information-based trading over time.*

To test the hypothesis, we use the approach of Collins et al. (1999), based on the Ohlson (1995) model, which expresses the stock price as a function of its earnings and book value after controlling for the differential accounting information conveyed by loss and profit firms and is given by[4]

$$MV_{it} = a_{0t} + a_{1t}BV_{it} + a_{2t}\,NI_{it} + a_{3t}\,DL_{it}\,BV_{it} + a_{4t}\,DL_{it}\,NI_{it} + error_{it}, \quad (1)$$

where MV_{it} is the market value of firm i in year t three months after the fiscal year-end, BV_{it} is the book value of equity of firm i at fiscal year-end t, NI_{it} is the earnings before extraordinary items of firm i for the fiscal year ending in year t, and DL_{it} is an indicator variable that is one if the earnings is negative and zero otherwise. We scale all the variables in Equation (1) by total assets (TA_{it}) to control for scale effects (see

Brown et. al., 1999).[5] Based on earlier results on the value relevance of accounting information over time, we expect the *R-squares* of Equation (1) to be decreasing over time.

To proxy for non-information-based (*NIB*) trading, we estimate information-based trading by using parameters of the distribution of individual analysts' earnings forecast revisions and subtracting the estimated information-based trading from trading volume to obtain *NIB* trading. Each individual analyst's one-year-ahead absolute forecast revision is defined as

$$REV_{ijkt} = \left| FEPS_{ijkt} - FEPS_{ij(k-1)t} \right| / \left| FEPS_{ij(k-1)t} \right|,$$

where $FEPS_{ijkt}$ represents the one-year-ahead earnings forecast for year t of firm i made by analyst j on dates k and (k-1). The distribution of the one-year-ahead forecast revisions for each firm-year is characterized by the mean ($MNREV_{it}$), the standard deviation ($STDREV_{it}$), the skewness ($SKREV_{it}$), and the kurtosis ($KRREV_{it}$), of the revisions for firm i in year t, across all individual analysts' forecast revisions. The percentage of common shares that is traded each day for each firm is computed as $PRVOL_{ikt} = TRVOL_{ikt}/CSOS_{ikt}$, where $TRVOL_{ikt}$ is firm i's trading volume on day k in year t and $CSOS_{ikt}$, is the corresponding number of common shares outstanding. VOL_{it}, the percentage of daily average trading volume for firm i in year t is computed as the mean of $PRVOL_{ikt}$ over the days k. We then estimate the following equation for each year:

$$VOL_{it} = k_{0t} + k_{1t} MNREV_{it} + k_{2t} STDREV_{it} + k_{3t} SKREV_{it} + k_{4t} KRREV_{it} + error_{it}, \quad (2)$$

where $MNREV_{it}$, $STDREV_{it}$, $SKREV_{it}$, and $KRREV_{it}$, are the mean, the standard deviation, the skewness and the kurtosis of the distribution of the absolute value of analysts' forecast revisions for firm i in year t.[6] We expect k_{2t} and k_{4t} to be positive, but because $MNREV_{it}$ and $SKREV_{it}$ can assume either positive or negative values, we offer no prediction of the sign of k_{1t} and k_{3t} . Non-information-based trading volume is then computed as

$$NIBVOL_{it} = VOL_{it} - [k_{1t}^{*} MNREV_{it} + k_{2t}^{*} STDREV_{it} + k_{3t}^{*} SKREV_{it} + k_{4t}^{*} KRREV_{it}], \quad (3)$$

where k_{it}^{*} are the estimates obtained from Equation (2).

We use a research design that is similar to Collins et al. (1997) and examine whether the decrease in value relevance of accounting information could be due to an increase in $NIBVOL_{it}$. Specifically, we compute the cross-sectional mean of $NIBVOL_{it}$ for year t as $MNIBVOL_t$. In time series, we then regress the *R-squares* obtained from estimating Equation (1) on $MNIBVOL_t$ as follows:

$$RSQ_t = b_0 + b_1\, MNIBVOL_t + error, \tag{4}$$

where RSQ_t is the annual R-square obtained from estimating Equation (1) and $MNIBVOL_t$ is the mean non-information-based trading volume ($NIBVOL_{it}$, see Equation (3)) in year t. Based on the hypothesis, we expect b_1 to be negative. Collins et. al. (1997) use a similar specification to examine the factors for declining value relevance as indicated by the estimated *R-squares* of Equation (1). Specifically, they consider the percentage of firms whose earnings number is negative each year (*MLOSS*), the percentage of firms with special items each year (*MONETIME*), and the percentage of firms operating in the intangible-intensive industry (*MINTANG*). We have controlled for the effect of negative earnings and one-time events by allowing the coefficients for the loss and profit firms to be different (see Equation (1)). To consider the differing impact of intangible intensity, we partition the sample based on the market-to-book ratios and estimate Equation (1).

The Sample and the Result

The sample consists of all firms in the Compustat Industrials Annual Database from 1983 to 2000 having data on net income (*NI*) [data item 172], total assets (*TA*) [data item 6], and book value of equity (*BV*) [data item 60], and for which the *IBES* database has data on the individual analysts' one-year-ahead forecasts of earnings per share, *FEPS*. We delete firms with negative book value of equity. The sample firms are matched with the stock price and common shares outstanding three months after the fiscal year-end from the *CRSP* database, which are used to compute the market value of equity, *MV*. The daily trading volume and the daily common shares outstanding are obtained from the *CRSP* database, and trading volume is winsorized at the 95th percentile. To control for the effects of extreme values, we delete

observations that are in the top and bottom 0.5% of price-to-earnings or market-to-book value and observations that have a studentized residual of greater than 4 standard deviations away from zero in estimating Equation (1). To compute the mean, the standard deviation, the skewness, and the kurtosis, we require at least five revisions for the firm for any given year *t* and winsorize the variables at the bottom and top 5% of the annual cross-sectional distribution. Our final sample contains 34,070 firm-year observations. The number of firms in the sample each year increases from about 3,102 in the 1970s to 6,087 in the 1990s. The mean (median) market value of equity increases from $228 ($29) million in the 1970s to $1,197 ($101) million in the 1990s; the book value of equity increases from $170 ($27) million in the 1970s to $556 ($61) million in the 1990s; net income increases from $22 ($3) million in the 1970s to $61 ($4) million in the 1990s; and the market-to-book ratio increases from 1.49 (1.02) in the 1970s to 3.71 (1.71) in the 1990s. The number of loss firms increases over time: the first quartile of earnings is negative in the 1990s, although it is positive in the 1970s. Overall, the sample characteristics, as well as our estimates of equilibrium, are similar to those of earlier studies.

We describe the behavior of *R-squares* obtained by estimating Equation (1) in Panel A of Table (1). In the 1980s, the R-square is about 56%; it declines to about 28% in the late 1990s, a 50% [=(56-28)/28] drop in the explanatory power of accounting information. We partition the sample into three groups based on high, medium, and low market-to-book ratios to proxy for high, medium, and low degrees of intangible intensity, respectively. The groups are formed based on the market-to-book ratio at the beginning of the year, with the top (bottom) 30% of the market-to-book ratio classified as the high (low) intangible intensity group. We find that the R-square of the high market-to-book ratio declined from 47% in the 1980s to about 26% in the late 1990s, while the corresponding (untabulated) *R-squares* for the low market-to-book ratio are 33% and 25%, respectively. This shows that the decline in *R-squares* is most prominent in the high market-to-book ratio group, which led earlier researchers to conclude that the value relevance of accounting information has declined considerably for highly intangible-intensive companies. Indeed, prior research has argued that financial accounting information is of limited use to investors when valuing service and high-tech companies that invest in intangibles such as research and development,

human capital, etc. The argument is that although intangibles may contribute to the value of the company, accounting rules generally do not recognize them. Hence, financial accounting information may not be value relevant for such intangible-intensive firms. To summarize, we find that the *R-squares* have declined over time and that the decline has been more pronounced in the highly intangible-intensive firms.

Insert Table 1 here

Our untabulated estimates of Equation (2) indicate that the coefficients on the standard deviation and kurtosis of the revisions are positive, as suggested by the Noisy Rational Expectation models. The *R-squares* obtained by estimating Equation (2) show a slight decline over time (26.20% in the early 1980s and 21.82% in the late 1990s), indicating that the information events explain a decreasing proportion of the trading volume over time. This suggests that non-information-based trading has been increasing over time. The *R-squares* for the low intangible intensity (market-to-book ratio) firms are 23.42% and 16.29% in the early 1980s and late 1990s, respectively and the *R-squares* for the high intangible intensity (market-to-book ratio) firms are 28.24% and 23.35% for the early 1980s and late 1990s, respectively. This suggests that for firms with low intangible intensity (Low Market-to-Book) the information events have a lower explanatory power than for highly intangible-intensive (High Market-to-Book) firms.

Our untabulated results indicate that the daily *NIB* trading volume (Equation (3)) was about 3% of the outstanding shares in the 1980s for all the market-to-book ratio groups, and in the late 1990s it was about 5.5% for the high market-to-book ratio group and about 4% for the low and medium market-to-book ratio groups. This implies that the *NIB* trading volume has increased by about 83% [=(5.5-3.0)/3.0] for the high market-to-book ratio and by about 33% [=(4-3)/3] for the low and medium market-to-book ratios. Thus, there is an overall increase in *NIB* trading, with the high market-to-book ratio firms showing the largest increase.

We next examine the hypothesis by estimating Equation (4). Table 2 provides the results.

Insert Table 2 here.

Equation (4) is estimated by weighted least squares, where the observations are weighted by the number of

companies used in estimating Equation (1), and also by ordinary least squares, where each observation is equally weighted.[7] The coefficients on *MNIBVOL* are negative and significant across all partitions of intangible intensity, indicating an overwhelming support for the theoretical prediction. The coefficients on M*NIBVOL* for the low, medium and high market-to-book groups are –0.03, -0.07, and -0.11, respectively, indicating that non-information-based trading has had a higher impact on stock prices for highly intangible-intensive firms. We next examine some extensions.

Extensions

Francis and Schipper (1999) contend that if volatility of market returns are increasing for non-information reasons, value relevance tests will be biased toward the result that relevance is decreasing over time, as a greater portion of the variability in returns will be unexplained by accounting information. Although the NREE models do not directly provide us with a conjecture regarding the specific relationship between stock prices and *NIB* trading volume, we expect that including *NIB* trading volume will help improve the explanatory power of Equation (1). In fact, one would expect a negative relation between *R-square* and *MNIBVOL* as we have shown in Table 2 to be logically equivalent to a statistically significant coefficient on *NIBVOL* as an explanatory variable in Equation (5) below. We use an augmented Collins et al. (1999) model to test this implication of *NIB* trading for explaining price variation. We estimate

$$MV_{it}=a_{0t}+a_{1t}BV_{it}+a_{2t}NI_{it}+a_{3t}DL_{it}BV_{it}+a_{4t}DL_{it}NI_{it}+a_{5t}NIBVOL_{it}+a_{6t}DL_{it}NIBVOL_{it}+error_{it}, \qquad (5)$$

where all variables are as defined before.

As with the estimation of Equation (1), we scale the variables in Equation (5) by Total Assets. Based on the NREE model, we cannot conjecture the sign of the coefficient on $NIBVOL_{it}$ (a_{5t}), but given our earlier evidence and the Francis and Schipper (1999) conjecture we expect the inclusion of $NIBVOL_{it}$ to improve the *R-squares* relative to those of equation (1) that excludes $NIBVOL_{it.}$ Table 1 provides the results of estimating equation (5) for the sample with analyst revisions spanning 1983 to 2000 as well as the estimates for the high intangible intensity (market-to-book ratio) group. For the purpose of comparison, we include in Table 1 the results of estimating equation (1) (which presents the regression without the

NIBVOL variable) so as to highlight the comparison between the two. The coefficient on non-information based trading volume (a_5) is not significantly different from zero for the early period (1983 to 1988) while for the later period (1995 to 2000) it is positive and significant for the whole sample and the high market-to-book ratio group. In the early years the addition of non-information based trading volume improves the explanatory power by about 5% [=(59 – 56/ 56)], while in the later years the addition of non-information based trading volume improves the explanatory power by about 25% [=(35 – 28/28)]. This improvement is similar for the high market-to-book ratio group and it provides a certain degree of support for the Francis and Schipper (1999) conjecture.

Robustness Tests Using Daily Trading Volume

We examine the association between our measure of *NIB* trading volume (*NIBVOL*) and the daily trading volume (*VOL*). In essence, we ascertain whether the average trading volume is a good proxy for *NIB* trading. The rank correlation between *NIBVOL* and *VOL* is around 90%, with the exception of 1983, when it is about 84%. Thus, in general, the daily trading volume is a good proxy for non-information-based trading activity. We thus obtain equation (5a) below by using the daily trading volume scaled by shares outstanding as a proxy for *NIB* trading to examine the decline in the value relevance of accounting information over the longer time horizon, i.e., 1963 to 2000.

$$MV_{it}=a_{0t}+a_{1t}BV_{it}+a_{2t}NI_{it}+a_{3t}DL_{it}BV_{it}+a_{4t}DL_{it}NI_{it}+a_{5t}VOL_{it}+a_{6t}DL_{it}VOL_{it}+error_{it} \quad (5a)$$

Since we no longer require analysts' data, we are able to estimate Equation (5a) in Figure 1 using *VOL* instead of *NIBVOL* for a larger sample of firms (149,888 firm-year observations) starting from 1963 and correspondingly estimate Equation (1) to compare the *R-squares* of the estimations. The coefficient (a_{5t}) on trading volume (*VOL*) of Equation (5a) is not significantly different from zero for the 1960s and 1970s, but for the 1980s and 1990s it is positive and significant for the whole sample and the market-to-book partitions. The effect of trading volume for loss firms is not significantly different from that for profit firms, as a_{6t} is not significantly different from zero for 35 of the 38 estimation years. The *R-squares* of Equations (1) and (5a) for the expanded sample are presented in Figure 1.

Insert Figure 1 here.

The decline in *R-squares* is attenuated by the inclusion of trading volume (Equation (5a)). In the 1960s and 1970s the *R-squares* are about 48%, and in the 1980s and 1990s the *R-squares* are about 37%, which represents a decline of 22% [=(48-37)/48], compared to a decline of 47% [= (48 – 31)/48] when Equation (1) is estimated. Thus, a temporally increasing portion of the decline in *R-square* is accounted for by the inclusion of non-information-based trading volume as proxied by trading volume.

3. Concluding Remarks

Past studies have focused on the examination of the value relevance of accounting numbers (such as earnings and book values) documenting a decline in contemporaneous associations between the accounting numbers and stock prices (levels or changes). In this paper, we empirically examine a theoretical prediction based on the noisy rational expectation equilibrium model that the declining value relevance could be due to increased non-information-based (*NIB*) trading activity. We find support for the theoretical prediction, which suggests that the decline in the value relevance of accounting information may not be as large as the associations indicate. An intriguing question is suggested by our findings: in light of the effects of *NIB* trading on the relationship between prices and accounting numbers, can the observed degree of association between the two be properly interpreted as "value relevance"? One implication of this is that future research should control for the effects of *NIB* trading before making "value relevance" inferences.

Endnotes

1. The incidence and significance of such trading are now recognized in finance circles. Grossman (1995) characterized non-information-based trading as follows: "in general, there may be many reasons for trade other than information. After all, the traditional view of the market is of a location where resources are reallocated. Reasons for these non-informational trades include cross-sectional changes in wealth, risk-preferences, liquidity needs, unanticipated investment opportunities and all other factors that do not directly relate to the payoffs of traded securities." For instance, in response to random shocks in their wealth or preferences, traders may rebalance their global portfolios, including non-financial assets. The results of such rebalancing, when restricted to a single market such as the stock market, may appear as random perturbations in asset holdings that are unrelated to information about underlying market values. For a similar notion, see also Krause and Smith (1989, p. 558).
2. See O'Dean (1998, 1999) for evidence consistent with the notion that *NIB* trading increased in the 1990s.
3. See also Dontoh and Ronen (1993), Dontoh et al. (2003) and Kim and Verrechia (1991).
4. Collins et. al. (1999) use the book value of equity at the beginning of the period, but Equation (1) is specified in terms of the book value at the end of the period. If we were to use the book value of equity at the beginning of the period, we would need to add the dividends to the market value of equity in Equation (1). Our specification is consistent with Ohlson's (1995) model. We obtain similar results when we use the beginning-of–the-year book value.
5. We also scaled the variables by net sales and beginning-of-the-year market value and obtained qualitatively similar results.
6. To show that using the daily trading volume will provide consistent estimates, we provide the following simple example. Consider the following true trading volume generating process as given by $V_{idt} = NIB_t + a_t\ REV_{idt}$, where V_{idt}, is the trading volume of firm *i* on day d in year *t,* REV_{idt} is the revision of the forecast for firm *i* on day d in year *t,* NIB_t is the non-information-based trading volume, and a_t is the coefficient on the revision. Let $NIB_t = 0.05$ and $a_t = 0.10$. Firms 1 and 2 have the following observable realizations of REV_{idt} and V_{idt} for five days in year *t {(0.5, 0.1), (0, 0.05), (0, 0.05), (0.7, 0.12), (0, 0.05)}*and *{(0, 0.05), (0, 0.05), (0.1, 0.06), (0.1, 0.06), (0.4, 0.09)}*. It can be verified that V_{idt} is generated by the assumed process; for example, 0.12 = 0.05 + (0.1*0.7). The mean revisions for firms 1 and 2 are 0.24 and 0.12, respectively; i.e., *0.24 = (0.5+0+0+0.7+0)/5 and 0.12 = (0+0+0.1+0.1+0.4)/5,* and the mean daily trading volumes are 0.074 and 0.062, respectively. Using the mean

daily trading volume and mean revisions, the slope estimate $a_t = (0.074 - 0.062)/(0.24 - 0.12) = 0.1$, and the intercept estimate $NIB_t = 0.074 - (0.1*0.24) = 0.05$.

7. See Brown et al. (1999), who use the weighted least squares estimation.

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TABLE 1: Accounting Information, Non-Information-Based Trading and Stock Prices

Panel A: Whole Sample

Years	1983 to 1988				1988 to 1994				1995 to 2000			
Number of Obs.	1,015				1,859				2,669			
Equation	Equation (1) *		Equation (5) *		Equation (1)		Equation (5)		Equation (1)		Equation (5)	
Variables†	Coeff.	t-stat	Coeff.	t-stat	Coeff.	t-stat	Coeff.	t-stat	Coeff.	t-stat	Coeff.	t-stat
Intercept, a_0	0.10	2.49	0.05	1.04	0.20	6.36	0.10	3.14	0.46	11.21	0.13	4.02
BV, a_1	1.59	3.78	1.62	1.58	1.01	3.63	1.04	3.10	3.10	5.32	3.10	2.75
NI, a_2	13.11	2.04	13.40	3.53	14.29	2.79	14.62	3.83	13.24	1.61	13.55	3.90
*DL*BV*, a_3	8.82	8.15	5.44	7.34	5.90	5.72	3.80	4.59	7.00	8.45	3.65	4.96
*DL*NI*, a_4	-14.43	-19.44	-14.15	-20.88	-16.23	-22.79	-15.87	-31.15	-15.72	-20.59	-15.07	-25.94
NIBVOL, a_5			0.03	1.99			0.11	2.21			0.68	3.06
*DL*NIBVOL*, a_6			0.54	1.84			0.72	2.59			0.98	2.91
R-square %	55.98		58.59		50.60		54.02		28.38		35.04	

Panel B: High Intangible Intensity (High Market-to-Book Ratio) †

Years	1983 to 1988				1988 to 1994				1995 to 2000			
Number of Obs. ‡	304				558				801			
Equation*	Equation (1)		Equation (5)		Equation (1)		Equation (5)		Equation (1)		Equation (5)	
Variables§	Coeff.	t-stat	Coeff.	t-stat	Coeff.	t-stat	Coeff.	t-stat	Coeff.	t-stat	Coeff.	t-stat
Intercept, a_0	0.68	5.20	0.55	3.77	0.75	8.97	0.50	5.45	1.54	14.73	0.78	7.81
BV, a_1	2.60	3.57	2.57	4.89	1.45	3.01	1.24	3.27	4.94	4.43	4.46	2.66
NI, a_2	11.38	1.07	11.83	12.88	13.50	1.27	13.83	4.39	10.77	0.88	11.84	13.82
*DL*BV*, a_3	3.03	2.38	-0.86	-0.77	21.12	13.23	16.53	15.19	-8.42	-0.04	-6.49	-0.76
*DL*NI*, a_4	-11.73	-9.28	-11.52	-6.98	-15.24	-15.38	-14.43	-13.49	-13.27	-11.72	-13.38	-12.99
NIBVOL, a_5			0.18	1.02			0.44	3.05			1.30	6.57
*DL*NIBVOL*, a_6			0.85	1.19			1.15	3.38			1.22	3.99
R-square %	46.79		48.87		40.92		45.99		25.93		31.23	

Notes:

*** Equations are defined as follows:**

Equation (1): $MV_{it} = a_{0t} + a_{1t}BV_{it} + a_{2t}\,NI_{it} + a_{3t}\,DL_{it}\,BV_{it} + a_{4t}\,DL_{it}\,NI_{it} + error_{it}$

Equation (5): $MV_{it}=a_{0t}+a_{1t}BV_{it}+a_{2t}NI_{it}+a_{3t}DL_{it}BV_{it}+a_{4t}DL_{it}NI_{it} + a_{5t}NIBVOL_{it}+a_{6t}DL_{it}NIBVOL_{it} + error_{it}$

Equation (2): $VOL_{it} = k_{0t} + k_{1t}MNREV_{it} + k_{2t}\,STDREV_{it} + k_{3t}\,SKREV_{it} + k_{4t}\,KRREV_{it} + error_{it}$

Equation (3): $NIBVOL_{it} = VOL_{it} - [k_{1t}^{*}MNREV_{it} + k_{2t}^{*}STDREV_{it} + k_{3t}^{*}SKREV_{it} + k_{4t}^{*}KRREV_{it}]$

All variables other than *NIBVOL* in Equations (1) and (5) are scaled by total assets.

Equations (1) and (5) are estimated cross-sectionally for each year from 1983 to 2000. The t-statistics for each year are adjusted using White's procedure. The numbers in the table are the means of the coefficients and adjusted t-statistics over the relevant period.

† The high market-to-book (*MB*) ratio group consists of firms in the top 30% based on the market-to-book ratio annually.

‡ The sample contains 34,070 firm-year observations spanning 1983-2000.

§ **Variable Definitions**

MV_{it} is the market value of firm i in year t three months after the fiscal year-end. BV_{it} is the book value of equity of firm i at fiscal year-end t. NI_{it} is the earnings before extraordinary items of firm i for the fiscal year ending in year t. MB_{it} is the market-to-book value of equity of firm i, computed using MV_{it} and BV_{it}. DL_{it} is an indicator variable that is one if NI_{it} is negative and zero otherwise. VOL_{it} is the percentage average daily trading volume for each firm computed as the mean of the daily trading volume of firm i in year t divided by the common shares outstanding for that day in year t. VOL_{it} is computed for each firm i, over the twelve months preceding the end of three months after the fiscal year-end. $FEPS_{ijkt}$ is analyst j's one-year-ahead forecast of earnings per share of firm i on date k for fiscal year t. $REV_{ijkt} = \left| FEPS_{ijkt} - FEPS_{ij(k-1)t} \right| / \left| FEPS_{ij(k-1)t} \right|$ is the absolute forecast revision, where (k-1) indicates the forecast preceding the one made on date k. $MNREV_{it}$, $STDREV_{it}$, $SKREV_{it}$, and $KRREV_{it}$ are the mean, standard deviation, skewness, and kurtosis of the absolute value of forecast revisions (REV) for firm i in year t.

TABLE 2: Value Relevance of Accounting Information and Non-Information-Based Trading

Panel A: Whole Sample**

Equation (4) *	Weighted Least Squares† Coefficient	t-statistic§	Ordinary Least Squares‡ Coefficient	t-statistic§
Intercept, b_0	0.82	31.49	0.81	27.05
MNIBVOL, b_1	-0.13	-16.32	-0.13	-13.17
R-square %	93.45		90.01	

Panel B: High Market-to-Book#

Equation (4)	Weighted Least Squares Coefficient	t-statistic	Ordinary Least Squares Coefficient	t-statistic
Intercept, b_0	0.71	17.97	0.66	8.59
MNIBVOL, b_1	-0.11	-10.08	-0.10	-4.51
R-square %	84.57		62.76	

Panel C: Medium Market-to-Book

Equation (4)	Weighted Least Squares Coefficient	t-statistic	Ordinary Least Squares Coefficient	t-statistic
Intercept, b_0	0.63	19.74	0.63	23.45
MNIBVOL, b_1	-0.07	-5.80	-0.07	-6.67
R-square %	81.62		84.16	

Panel D: Low Market-to-Book

Equation (4)	Weighted Least Squares Coefficient	t-statistic	Ordinary Least Squares Coefficient	t-statistic
Intercept, b_0	0.38	8.89	0.37	10.23
MNIBVOL, b_1	-0.03	-2.55	-0.03	-2.33
R-square %	35.84		24.53	

Notes:

* **Equations are defined as follows:**

Equation (1)*:* $MV_{it} = a_{0t} + a_{1t}BV_{it} + a_{2t}\,NI_{it} + a_{3t}\,DL_{it}\,BV_{it} + a_{4t}\,DL_{it}\,NI_{it} + error_{it}$

Equation (2)*:* $VOL_{it} = k_{0t} + k_{1t}MNREV_{it} + k_{2t}\,STDREV_{it} + k_{3t}\,SKREV_{it} + k_{4t}\,KRREV_{it} + error_{it}$

Equation (3)*:* $NIBVOL_{it} = VOL_{it} - [k_{1t}^{*}MNREV_{it} + k_{2t}^{*}STDREV_{it} + k_{3t}^{*}SKREV_{it} + k_{4t}^{*}KRREV_{it}]$

Equation (4)*:* $RSQ_t = b_0 + b_1MNIBVOL_t + error_t$

† In the Weighted Least Squares estimation the observations are weighted by the number of companies used in estimating Equation (1); see Brown et al. (1999).

‡ In the Ordinary Least Squares estimation each observation is equally weighted.

§ The t-statistics are adjusted using White's procedure.

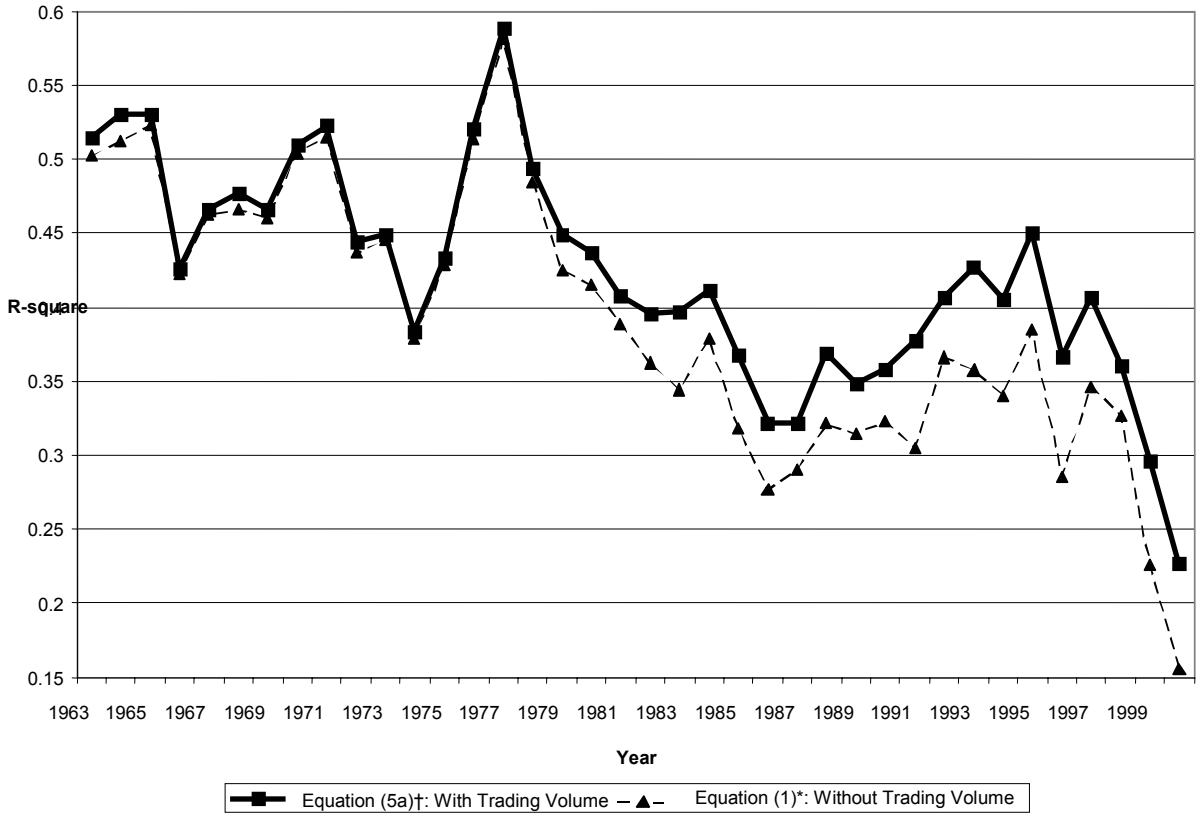
he high (low) market-to-book ratio group consists of firms in the top (bottom) 30% ranked annually based on the market-to-book ratio. The medium market-to-book ratio group contains the remaining 40% of the observations.

** The sample contains 34,070 firm-year observations from 1983 to 2000.

†† **Variable Definitions:**

RSQ_t is the R-square obtained by estimating Equation (1). $MNIBVOL_t$ is the cross-sectional mean for year t of $NIBVOL_{it}$, which for firm i in year t is the residual plus the intercept obtained from estimating Equation (2) annually as defined in Equation (3). VOL_{it} is the percentage average daily trading volume for each firm computed as the mean of the daily trading volume of firm i in year t divided by the common shares outstanding for that day in year t. VOL_{it} is computed for each firm i, over the twelve months preceding the end of three months after the fiscal year-end. $FEPS_{ijkt}$ is analyst j's one-year-ahead forecast of earnings per share of firm i on date k for fiscal year t. $REV_{ijkt} = \left| FEPS_{ijkt} - FEPS_{ij(k-1)t} \right| / \left| FEPS_{ij(k-1)t} \right|$ is the absolute forecast revision, where (k-1) indicates the forecast preceding the one made on date k. $MNREV_{it}$, $STDREV_{it}$, $SKREV_{it}$, and $KRREV_{it}$ are the mean, standard deviation, skewness, and kurtosis of the absolute value of forecast revisions (REV) for firm i in year t.

FIGURE 1: Accounting Information, Trading Volume and Stock Prices‡



Notes

* Equation (1): $MV_{it} = a_{0t} + a_{1t}BV_{it} + a_{2t}\,NI_{it} + a_{3t}\,DL_{it}\,BV_{it} + a_{4t}\,DL_{it}\,NI_{it} + error_{it}$

† Equation (5a): $MV_{it}=a_{0t}+a_{1t}BV_{it}+a_{2t}NI_{it}+a_{3t}DL_{it}BV_{it}+a_{4t}DL_{it}NI_{it} + a_{5t}VOL_{it}+a_{6t}DL_{it}VOL_{it} + error_{it}$

Equation (5a) is Equation (5) where *NIBVOL* is replaced with *VOL*. All variables other than *VOL* in Equation (5a) are scaled by total assets. Equations (1) and (5a) are estimated cross-sectionally for each year from 1963 to 2000. The t-statistics for each year are the adjusted using White's procedure. The numbers in the table are the means of the coefficients and adjusted t-statistics over the relevant period. The sample contains 149,888 firm-year observations from 1963 to 2000.

‡ **Variable Definitions:**

MV_{it} is the market value of firm *i* in year *t* three months after the fiscal year-end. BV_{it} is the book value of equity of firm *i* at fiscal year-end t. NI_{it} is the earnings before extraordinary items of firm *i* for the fiscal year ending in year t. MB_{it} is the market-to-book value of equity of firm *i,* computed using MV_{it} and BV_{it}. DL_{it} is

an indicator variable that is one if NI_{it} is negative and zero otherwise. VOL_{it} is computed for each firm i over the twelve months preceding the end of three months after the fiscal year-end.