Impact of Information Technology Adoption on Value Relevance of Accounting Information: Evidence from the Colombo Stock Exchange

Chandrapala Pathirawasam, Faculty of Economics and Management, Tomas Bata University, Zlin, Czech Republic, pathi3@yahoo.com

Abstract

The purpose of this paper is to investigate the value relevance of earning based accounting information and to see how value relevance has changed with the introduction of new information technology at Colombo Stock Exchange (CSE) in Sri Lanka. Sample of the study includes 129 companies selected from 6 major sectors at CSE. Cross sectional and time series cross-sectional regression are used for the data analysis. Study finds that earnings per share and returns on equity have a significant impact on market price. However, the explanatory power of combined variables is below average. Further, value explanatory power of earnings has considerably improved after the new information technology adoption at CSE. This study is unique because it examines the impact of technological advancements on value relevance of accounting information as the first paper to be applied on Sri Lanka.

Keywords: Value relevance, Accounting information, Earnings per share, Return on equity

Introduction

The main objective of financial reporting is to assist investors in valuing equity. For financial reporting to be value relevant, it is a condition that accounting numbers should be related to current company value. If there is no association between accounting numbers and company value, accounting information can not be termed value relevance.

The concept of value relevance can be defined in number of ways. For instance, Francis and Schipper (1999) discuss four different interpretations of value relevance. Based on their definitions; the author define value relevance as the ability of information in financial statements to capture and/or summaries information that determines value of firms. Therefore, value relevance is measured as the degree of statistical relationship between information included in accounting statements and market value (price) or returns. Value relevance can be measured in short term event studies comparable to the one performed by Ball and Brown (1968) or long term association studies. This study focuses on value relevance on long term annual observations of companies listed at CSE.

Value relevance researchers are interested in how accounting information affects market values of equity. Hence, this study has three objectives. First, to study how accounting information is related to market value of equity. The second objective is to study how much accounting information explains the variation in equity values and the third objective is to see the impact of new technology adoption at CSE on value relevance of accounting information.

Although share trading in Sri Lanka started in 1985 at CSE, technological advancements were slow until recent past. CSE introduced a new website in October 2007 to provide quick, more accurate and timely market based and other public information of each company. With this facility, all investors could access to financial statements of each company through the new website and earlier financial reports were sent

by mail. Therefore, this study is going to examine how the new technology adoption at CSE has increased the value relevance of accounting information contained in financial information in Sri Lanka?

Employing cross-sectional and time series cross-sectional regressions, this study finds that earnings have a positively significant impact on market value of shares. Further the value relevance of earnings information has increased after the adoption of new information technology at CSE.

The remaining of the paper is organized as follows. Section 2 gives a brief description of CSE while Section 3 presents the review of literature. Section 4 explains sample and methodology and section 5 contains results of the analysis. The last Section is conclusion of the study.

Colombo Stock Exchange

Although share trading in Sri Lanka commenced in 1896, formalization of the market was started with the establishment of the "Colombo Securities Exchange (GTE) Limited" in 1985, which took over the operations of the stock market from the Colombo Share Brokers' Association. It was renamed as 'Colombo Stock Exchange' (CSE) in 1990. The CSE is a company limited by guarantee, established under the Companies Act No. 17 of 1982 and is licensed by the Securities and Exchange Commission of Sri Lanka (SEC).

The CSE has 234 listed companies representing 20 business sectors as at August 2010. CSE recorded its highest market capitalization of Rs. 1380.19 billion (approx. US $ 12 billion) on the May 2010. At present CSE is one of the best performing markets in the world. During the period 1990 to 2009 All Share Price Index (ASPI) recorded an average annual return of 23.04 percent and in the last year (2009) it was 103.10 percent which is one of the highest when compared with worldwide exchanges.

The CSE was one of the first Exchanges in the region to successfully automate its clearing and settlement functions in 1991, with the installation of a Central Depository and an Electronic Clearing and Settlement System for share transactions, and an Automated Trading System (ATS) in 1997. Further in 1991 CSE took measures to liberalize the investment in the stock market with the abolition of 100 percent transfer of property tax on share purchase by non-nationals. In the year 2009 foreign trading was 54 percent of the total value of annual transactions.

Internet trading was started by one brokerage firm in June 2003. At present internet trading at the CSE is facilitated via eighteen broker firms. The new CSE website, www.cse.lk, was launched in October 2007. This website provides access to a comprehensive array of real time market information, order book information, charts and graphs of market and company financial statements in order to help existing and potential investors to make investment decisions. The new website is designed with the view of making primary communication channel for the CSE and most information with downloadable facilities with the formats of Excel, Concurrent Versions System (CSV) and Hyper Text Markup Language (HTML). With the introduction of this new website the annual financial reports of listed accompanies are provided online for investors. Before the introduction of this facility investors get annual reports of listed companies after longer time of the financial year. Further under the new information technology adoption investors can access to financial information of all the listed companies even if they do not have invested money. Therefore, new technology adoption should increase the value relevance of financial information.

Review of Literature

Value of an asset can be defined in three ways: economic value, accounting value and market value . This study uses the market value of stocks to measure the value relevance of accounting information. Further past literature views value relevance from four perspectives. Therefore, this section describes the different perspectives of value relevance and some empirical findings on value relevance studies.

Different perspectives on value relevance

Francis and Schipper (1999) and Oyerinde (2009) define value relevance from four perspectives: (a) Fundamental analysis view of value relevance - intrinsic value of the firm is measured without referring to market value. According to this approach value relevance focuses on the usefulness of accounting information in equity valuation. Information in financial statements are relevant for valuation if portfolios based on this information generate abnormal returns. (b) The predictive view of value relevance –the accounting number is relevant if it can be used to predict future earnings, dividends, or future cash flows. (c) the information view of value relevance – where the value relevance of accounting information is measured in terms of market reactions to new information. (d) the measurement view of value relevance – the financial statement is measured by its ability to capture or summarize information that affects equity value. Both price and returns can be used for value relevance under measurement view approach. Nilsson (2003, p. 5) states that "if an accounting item has a reliable association with a market matrix, then the accounting matrix captures or aggregates the information that is used by market participants to determine prices or returns". This study follows the measurement view to the value relevance because Penman and Xiao-Jun (2002) claims that much of empirical work in market based accounting research has been misdirected in taking informational perspective that assumes accounting numbers affect share prices only if they provide new information. He points out that there should be a return to fundamentals and a switch to a measurement perspective that views accounting numbers as useful determinants of asset value. Hence, this study follows the measurement view of value relevance of accounting information.

Literature

Most of the early empirical studies in the field of market based accounting research focus on earnings and are usually concerned with response coefficient that relates earnings to returns and prices. Lev (1989) reports that earnings generally have very low explanatory power, and suggest that the practical value of reported earnings is in doubt. He finds that explanatory power measured by R^2 is often below 10% and it approaches zero in some cases.

Frankel and Lee (1998) discover relationships between share prices and accounting variables using data from 20 countries including US and Japan. They used current earnings, current book value and earnings forecasts to see the value relevance of accounting information. Their dependent variable is share prices. The explanatory power of the model is high, 88% for US and 72% for other countries combined.

King and Langli (1998) examine relationships between share prices and two main accounting variables with data from Germany, Norway and the United Kingdom. They selected these countries because the accounting system is quite different. The authors estimate a model that consists of share prices as the dependent variable and book value and current earnings as independent variables. Their findings reveal that both book values and earnings are significantly related to share prices in all three countries. However, the three variables have combined explanatory power of about 70% in the United Kingdom, 60% in

Norway and 40% in Germany. They further find that explanatory power of variables are differs in the accounting systems of the three countries. Book values explain more than earnings in Germany and Norway but less than earnings in United Kingdom. This is approved by Bao and Chow (1999) who report that earnings are highly associated with stock prices in Chinese market while book values are not.

Oyerinde (2009) examines the value relevance of accounting data in the Nigerian Stock Market. He uses a model which use average price per share as dependent variable with earnings per share, earnings yield and returns on equity as independent variables. The sample consists of top 30 companies from 2001 to 2004 in Nigerian Stock Market. He finds that the relationship between share price and earnings per share is high but the return on equity is very low. However, combined model of all the variables reflected very high level of R^2 value of more than 95% each year.

Perera and Thrikawala (2010) examines the value relevance of accounting information on CSE taking 6 commercial banks listed in CSE from 2005-2009. They use the model used by Oyerinde (2009). They find that earnings per share and return on equity are significantly related with share price and only earnings per share reflect higher explanatory power on market price.

The following papers examine the change in value relevance of accounting information over time. Collins, Maydew and Weiss (1997) investigate the value relevance of earnings and book values of equity over 40 years time. R^2 is used as the primary metric of value relevance. They conclude that the incremental value relevance of earnings has declined over the last 40 years. This view is accepted by the Francis and Schipper (1999). They also report that value relevance has declined for earnings getting R^2 value 27% in 1952 to 16% in 1994. Brown, Kim and Lys (1999) find that value relevance as measured by R^2 has declined significantly when controlling for different scale effect. Lev and Zarowin (1999) suggest that the value relevance of book value, earnings and cash flows have decreased over the past 20 years. They further report that value relevance deterioration more pronounced for cash flows than earnings. The reason for the deterioration of value relevance is the rate of change.

Sample and Methodology

Sample

The initial sample classification is given in the table 1.

Table 1: Classification of the sample

Sector	No of companies	% of market capitalization
Bank, Finance and Insurance	27	17.88
Food and Beverage	15	11.96
Hotel	27	9.89
Manufacturing	28	5.88
Plantation	17	1.73
Land and Property	15	1.77
Total	129	49.11

Source: CSE data library 2009

Total sample of the study consists of 129 companies from 6 main sectors at CSE. Companies selected for the study under each sector and percentage of sector market capitalization out of total is given in table 1.

Monthly prices for stocks and accounting information are taken from CSE data library 2009 and annual reports of each company respectively.

Prior research has shown that negative earnings are less value-relevant than positive earnings (e.g.,Hayn 1995 and Basu, 1997). Therefore, this study concerns only the companies which have positive earnings. The table 2 shows number of qualified companies for the analysis for each year.

Table 2: Companies qualified for the study

Year	Number of companies qualified for the study
2006	113
2007	109
2008	103
2009	84

Methodology

The idea of value relevance research is to establish a relationship between market values of equity and accounting variables. This can formally be expressed as follows.

$$MVE = f(AI) \quad (1)$$

Where,

MVE = market value of equity

AI = accounting information

Established on ideas of Ohlson (1995) and Edwards and Bell (1961) a model is adopted which used market price per share (MPS) as the dependent variable and earnings and return on equity as independent variables.

$$P = \beta_0 + \beta_1 EPS_{it} + \beta_2 ROE_{it} + \varepsilon \quad (2)$$

In order to avoid look-ahead bias problem recognized by Banz and Breen (1986) the dependent variable is taken as price of shares 3 months after the end of financial year. Look-ahead is a bias caused by using data which are not yet available but assumes to be available. Actually, accounting information will come to investors' hand when they receive the annual report of the company and not at the last date of financial year.

In order to test the relation between stock price and each variable in isolation, the following regression models are established.

$$P_{it} = \beta_0 + \beta_1 EPS_{it} + \varepsilon \quad (3)$$

The equation 3 examines the relationship between price of share and earnings per share.

$$P_{it} = \beta_0 + \beta_1 ROE_{it} + \varepsilon \quad (4)$$

The equation 4 examines the relationship between price of share and return on equity.

Coefficient of determination (R^2) is used as the measurement for explanatory power of models 2,3 and 4. The period before the adoption of new information technology is consists of years 2006 and 2007 while the post information technology adoption period is consist of years 2008 and 2009. Then the average incremental value of R^2 after new technology adoption (R^2_{incre}) can be defined as,

$$R^2_{incre} = R^2_2 - R^2_1 \quad (5)$$

Where,

$$R^2_2 = \left(R^2_{2008} + R^2_{2009}\right)/2$$
$$R^2_1 = \left(R^2_{2006} + R^2_{2007}\right)/2$$

Results

Section 5.1 describes the value relevance of EPS and ROE while Section 5.2 discuss the relative difference of the explanatory power of value relevance between two periods, before the adoption of new information technology and after the adoption of new information technology at CSE.

Value relevance of EPS and ROE

The table 3 reports descriptive statistics for variables. The mean value of MPS is 76 rupees with standard deviation 81.30 and the minimum and maximum values are not too far from the 99 percent significant levels under the normal curve. The mean value of EPS is 10 with standard deviation 15.44. The mean value of ROE is 16 with the standard deviation 14.64. This shows that both distributions have a great dispersion. Also the unreported computations find that the correlation between EPS and ROE is below average (r=0.31). It means that there is no multicolinearty problem between the two variables.

Table 3: Descriptive statistics

	MPS	EPS	ROE %
Mean	76	10	16
Standard deviation	81.30	15.44	14.64
Maximum	342	169	95
Minimum	1.10	0.01	0.04

In order to test the value relevance of EPS and ROE the equation 2, 3 and 4 are run on market price per share. The results are presented in tables 4 and 5. Panel A of the table 4 shows the results for EPS variable. EPS has strong value relevance in all the 4 years concerned and overall sample also (β=3.54, t=15.11). The explanatory power of the variable measured by R^2 has increased throughout the period (R^2 =27.19 in 2006 to 68.73 in 2009) and explanatory power for overall sample is below average (R^2 =35.94).

Panel B of table shows results for ROE variable estimated using equation 4. Similar to the EPS, ROE has a positively significant effect on share price for all the years concerned. However, the explanatory power of the variable is lower than that of the EPS. The maximum explanatory power is recorded in year 2008 (R^2 =15.48).

Table 4: Value relevance of EPS and ROE

Year	β	t-value	R^2
Panel A			
2006	4.05	6.43***	27.19
2007	2.40	7.02***	31.57
2008	4.18	11.04***	54.47
2009	7.37	13.42***	68.73
Overall	3.54	15.11***	35.94
Panel B			
2006	1.24	2.35**	4.75
2007	1.90	3.56***	10.59
2008	2.05	4.30***	15.48
2009	2.94	3.53***	13.24
Overall	1.83	6.30***	8.88

** Significantly different from zero at the 5% level.

*** Significantly different from zero at the 1% level.

The table 5 reflects results of combined value relevance of ROE and EPS as per the equation 2. Slope coefficients (β_1 and β_2) of the equation 2 for both variables are statistically significant for all years except 2006 for ROE (β=-0.02, t=-0.04). The explanatory power of the combined model is minimum in 2006 (R^2 =27.19) and maximum in 2009 (R^2 =71.16). For the overall period R^2 is 37.26. Therefore, findings reflect that there is a very little increase in R^2 when compare with the R^2 of the equation 3 in the panel A of table 4. Reason for the little increase in explanatory power of combined model (2) is the low explanatory power of ROE and the positive co-movement of both variables (r = 0.31).

Table 5: Value relevance of combined model of EPS and ROE

Year	β1-EPS	t-value	β2- ROE	t-value	R2
2006	4.06	5.82***	-0.02	-0.04	27.19
2007	2.18	6.15***	0.98	2.02**	34.12
2008	3.86	10.10***	1.01	2.88***	58.19
2009	7.00	12.91***	1.42	2.88***	71.16
overall	3.31	2.92***	0.74	2.92***	37.26

** Significantly different from zero at the 5% level.

*** Significantly different from zero at the 1% level.

The findings clearly conclude that earning based accounting information has a below average (R^2=37.26) relevance to the market value in Sri Lanka. Findings of this study are inconsistent with Lev (1989) who reports that value relevance of earnings is negligible. And also findings do not agree with Bao and Chow (1999, Frankel and Lee (1998), Oyerinde (2009), Perera and Thrikawala (2010) who report that earnings have a strong explanatory power on share price. However, the findings of Perera and Thrikawala(2010)

can not be accepted because their sample is extremely low (6) to generalize findings. However, the findings of this study are some what related to the findings of King and Langli (1998) in their German sample. Collins, Maydew and Weiss (1997), Francis and Schipper (1999), Brown, Kin and Lys (1999), Lev and Zarowin (1999) report that value relevance of accounting variables has declined over the period. However, the author finds that value relevance of earnings has increased over the four years concerned in this study. But this increment in value relevance over the time should be interpreted with a caution because time period taken for this study is a special period over which some technological advancement has affected on the value relevance of accounting information.

Incremental value relevance after adopting new information technology.

The incremental value relevance of EPS and ROE is tested by comparing the average R^2 values of model 2, 3 and 4 before the adoption of new information technology (before October 2007) and after the adoption of new information technology as shown in equation 5. Table 5 shows that average explanatory power has increased substantially after the new website is launched. Average explanatory power of EPS has increased by 32.72 percent from 28.81 to 61.60 after the new website was launched by the end of the year 2007. As in the table, there is clear evidence that value relevance of variable ROE and combined variables (EPS and ROE) has substantially increased (R^2 =6.59 and 34.02 respectively) after the adoption of new technology in October 2007 at CSE.

Table 6: Incremental value relevance after technology adoption

	Average R2 of 2008+2009	Average R2 of 2006+2007	Difference
EPS	61.60	28.81	32.72
ROE	14.36	7.77	6.59
EPS + ROE	64.67	30.65	34.02

Conclusion

Value relevance is one of the key major areas in market based accounting research. Past studies have shown that among other variables earnings has a significant relationship with the market price of stocks. Some studies have shown that value relevance of accounting information has changed over the time due to changes in accounting as well as business environment.

CSE renovated its existing website in October 2007. The new website provides comprehensive array of online data including company profiles and company annual reports. Before the introduction of this facility investors received annual reports of companies by mail and it took considerable time and no one got access to all the financial reports of listed companies. Therefore, this study hypotheses that new technology adoption at CSE should increase the value relevance of accounting information in Sri Lanka.

This paper has two main objectives. First objective is to test the value relevance of earning information and the second objective is to examine the impact of new information technology adoption at CSE on the value relevance of earnings.

The sample of the study is 129 companies from 6 largest sectors at CSE in terms of number of companies. Study uses cross-sectional regression as well as pooled regression techniques for

the analysis. This study finds that earnings measured as EPS and ROE have a positive and statistically significant relationship with market price per share. Further earnings have a below average (R^2=37.26) explanatory power on market price of stocks. New technology adoption has considerably increased the value relevance of accounting based earning information in Sri Lanka.

References

Ball, R. and Brown, P. (1968), 'An Empirical Evaluation of Accounting Income Numbers,' *Journal of Accounting Research*, 6(2), 159-178.

Banz, R. and Breen, W. (1986), 'Sample Dependent Results Using Accounting and Marketing Data: some Evidence,' *Journal of Finance*, 41, 779-793.

Bao, B H. and Chow, L. (1999), 'The Usefulness of Earnings and Book Values for Equity Valuation in Emerging Capital Markets: Evidence from Listed Companies in the People's Republic of China,' *Journal of International Financial Management and Accounting*, 10, 85-104.

Basu, S. (1997), 'The Conservatism Principle and the Asymmetric Timeliness of Earnings,' *Journal of Accounting & Economics*, 24(1), 3-27.

Brown, S., Kin, L. and Lys, T. (1999), 'Use of R^2 in Accounting Research: Measuring Changes in Value Relevance over the Last four Decades,' *Journal of Accounting & Economics*, 28(2), 83-115.

Collins, D W., Maydew, E L. and Weiss, IS. (1997), 'Changes in the Value-relevance of Earnings and Book Values over the Past Forty Years,' *Journal of Accounting & Economics*, 24(1), 143-181.

Edwards, E O. and Bell, P W. (1961), The Theory and Measurement of Business Income. Berkeley and Los Angeles: University of California Press.

Francis, J. and Schipper, K. (1999), 'Have Financial Statements Lost Their Relevance?,' *Journal of Accounting Research*, 37(2), 319-352.

Frankel, R. and Lee, C M C. (1998), 'Accounting Diversity and International Valuation,' Working Paper, University of Michigan and Cornell University.

Hayn, C. (1995), 'The Information Content of Losses. *Journal of Accounting & Economics*,' 20(2), 125-153.

King, R D. and Langli, J C. (1998), 'Accounting Diversity and Firm Valuation,' *International Journal of Accounting*, 33(4), 529-567.

Lev, B. (1989), 'On the Usefulness of Earnings and Earnings Research: Lessons and Directions from Two Decades of Empirical Research,' *Journal of Accounting Research*, 27(3), 153-192.

Lev, B. and Zarowin, P. (1999), 'The Boundaries of Financial Reporting and How to Extend Them,' *Journal of Accounting Research*, 37(2), 353-385.

Nilsson, H. (2003). Essay on Value Relevance of Financial Statement Information, Print and Media,

Ohlson, J A. (1995), 'Earnings, Book Values and Dividends in Security Valuation,' *Contemporary Accounting Research*, 1, 1661- 688.

Oyerinde D T. (2009), 'Value relevance of Accounting Information in Emerging stock Market in Nigeria' Proceedings of the 10th Annual International Conference of International Academy of African Business and Development (IAABD), ISBN. 0-9765288-4-3, 19-23 May 2009, Uganda.

Penman, S H. and Xiao-Jun, Z. (2002), 'Accounting Conservatism, the Quality of Earnings, and Stock Returns,' *Accounting Review,* 77(2), 237-264.

Perera, R A A S. and Thrikawala, S S. (2010), 'An Empirical Study of the Relevance of Accounting Information on Investor's Decisions, Proceedings of International Research Conference on Business & Information, ISBN 978-955-8044-91-8, 4th June 2010, Sri Lanka.