XBRL Adoption and Information Asymmetry : Evidence from the Indian Capital Market

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Abstract

Purpose : The study was conducted in the context of the Indian capital market to find out the effect of adopting XBRL (eXtensible Business Reporting Language) on the reduction of information asymmetry and the impact of XBRL on the trading volume of the market.

Methodology : In the current study, trading volume has been taken as the proxy variable to study the impact of XBRL adoption on information asymmetry. The study focused on the pre-and post-adoption XBRL effect on information asymmetry, followed by the influence of the implementation of XBRL, which is measured by taking the trading volume of the Indian capital market as a proxy variable. Data for 270 listed firms were collected for this research during a 20-year period, from 2001–2020, including 11 years before the implementation of XBRL and 9 years after it.

Findings : There is a significant difference in the information asymmetry pre- and post-adoption of XBRL by Indian listed firms. A strong positive and significant relationship has been found between XBRL and the trading volume of the Indian capital market due to a reduction in information asymmetry.

Practical Implications : Listed companies might increase investments by offering their stakeholders XBRL-enabled software and services. Regulatory authorities can also enable companies to disclose reports that are useful to decision-making stakeholders according to the XBRL taxonomy. The adoption of XBRL helps reduce information asymmetry, increase companies' valuation, and lower the cost of capital.

Originality : This study contributes to the financial reporting and Indian capital markets fields. This study contributes to the literature by identifying the impact on Indian capital markets post-adoption of XBRL.

Keywords : **XBRL, corporate reporting, information asymmetry, Indian capital market**

JEL Classification Code s : M1, M41, M48

Paper Submission Date : September 25, 2022 ; Paper sent back for Revision : May 22, 2023 ; Paper Acceptance Date : May 30, 2023 ; Paper Published Online : July 15, 2023

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DOI : https://doi.org/10.17010/ijf/2023/v17i7/170240

The Internet is one of the main media for corporate data news (Debreceny & Gray, 2001). The data available differs in some or other type of method or the way it is presented, due to which the data accessible on the internet does not meet the demand of the capital market participants. XBRL (eXtensible Business Reporting Language) is a technological advancement to achieve this as it presents financial data in the most cost-effective and quicker way. It is a language that revolutionizes business reporting around the world for communicating financial data through digital platforms. XBRL is derived from XML, an online marketplace for exchanging electronic data. It was specifically intended to transmit financial data between companies and other stakeholders such as analysts, traders, and regulatory bodies. This provides significant advantages in the preparation of business information and, thus, the analysis and communication of the same. XBRL, a publicly accessible, transparent, and global standard language for the digital exchange of financial evidence of corporates, is one of the topmost ten novelties for bookkeeping and auditing professionals and is committed to developing a global standard to improve the reliability, accuracy, performance, availability, and accessibility of financial data of the corporate sector through electronic communication. This has also made it easier for the stakeholders to access financial data, which is now standardized, consistent, and easily comparable (Sharma & Gupta, 2019).

XBRL is an XML (eXtensible Markup Language) version for business reporting. XBRL describes web-centered financial data which can be readable by machines and thus facilitates automatic analysis of data. Adoption of XBRL leads to cooperation between market participants and increases the accuracy of stakeholder decisions. It is also important for the filing companies to report their business in XBRL format. If a particular company generates standardized financial information by adopting a quality format, current and prospective investors of the economy are likely to assess that company to be less risky. It also further decreases capital costs and enhances the company's valuation in secondary markets. Diamond and Verrecchia (1991) stated that if transparency levels increase, the information asymmetry level decreases, which ultimately results in increased demand from investors. This research investigates whether the XBRL adoption has reduced the degree of imperfect information in the stock market of India or not. XBRL has been mandated to be adopted by various countries, which include India, Belgium, China, Chile, Israel, Denmark, Luxembourg, Singapore, South Korea, Spain, and Japan (Liu & O'Farrell, 2013).

India is one of the top nations in creating a compulsory XBRL-format filing program. This law has been in force in India since June 2011, as per the circular published by the Ministry of Corporate Affairs (MCA), to make financial markets transparent and vibrant and to achieve the confidence of the market participants (Bhattacharjee & Swaminathan, 2016). So, the Indian capital market is thus an appropriate market as a target for investigating the effect of pre-post XBRL adoption on information asymmetry. The key aim of this study is to investigate empirically if there is any reduction in information asymmetry with the adoption of XBRL in the capital market over time.

Literature Review

Information asymmetry means someone has that particular information that other parties do not possess (Liu et al., 2017). Information asymmetry encourages the unwillingness of an individual to invest in capital markets with the fear of potential losses resulting in an increase in the cost of capital for the firm. The decision-making of a well-informed investor also depends upon the quality of information available in the market (Deepak & Gowda, 2014). Some of the studies done in the past have confirmed that high-quality reporting in financial statements reduces information asymmetry (Ellili, 2022; Gupta & Bhalla, 2022; Heflin et al., 2005; Leuz & Verrecchia, 2000; Vander Bauwhede et al., 2015). XBRL increases investors' ability to search for information in order to decrease information asymmetry in the stock market. Just because of the immense, powerful searching capacity of XBRL, all the categories of investors are benefited (Hodge et al., 2004). Also, Hodge et al. (2004) concluded that the

XBRL allows the various users of financial statements to access and incorporate information on relevant financial statements and footnotes in making investment decisions. This increased quality of information and the ability to search for information is expected to contribute to better transparency of information and reduce information asymmetry. Yoon et al. (2011) further concluded that XBRL adoption reduces the imperfect information in the financial system by raising the corporate disclosure level. Awareness and experience in XBRL are important in XBRL implementation. Because of their ability to achieve economies of scale, large organizations could be in a stronger position to achieve better business performance. Tanriverdi (2005) focused on investment analysts, and the media also paid more attention to big corporations. Few studies have also claimed that the size of the organization is correlated negatively with the proxies of data asymmetry.

Liu et al. (2017) and Yoon et al. (2011) found a negative association with the proxy of information asymmetry. Studies done in the past have different thoughts on taking a proxy for information asymmetry. Some of the proxy measures for information asymmetry include trading volume, stock price volatility, bid–ask spread, and turnover, that is, trading volume over shares outstanding (Ante, 2020; Eckbo & Norli, 2005; Goel et al., 2021). The trading volume displays the number of shares over a particular period of time. The decrease in information asymmetry leads to an increase in the intention to sell and buy, increasing the amount of trading volume. Volatility in stock prices is defined as a variation. In general, volatility reflects the risk or uncertainty in the stock market. If there is little information asymmetry in the capital market and the market is functioning efficiently, the stock price unpredictability seems to be minimal. Market price volatility and trading volume are closely linked with information asymmetry (Clarke & Shastri, 2000). Based on these discussions, this study adopted a simple direct approach and used trading volume as a proxy variable for information asymmetry.

Objectives of the Study

- To study the pre and post-adoption XBRL effect on information asymmetry of the Indian capital market.
- To analyze the impact of XBRL adoption on reducing the information asymmetry of the Indian capital market.

Research Methodology

It is common knowledge that knowledgeable investors make better market judgments because they are better protected. XBRL, a worldwide standard for digital company reporting, aids in minimizing information asymmetry and inspiring investors to make investments (Blankespoor et al., 2014; Cong et al., 2014; Liu et al., 2017; Yen & Wang, 2015; Yoon et al., 2011). Information asymmetry can be measured through various proxy variables like trading volume, bid-ask spread, and volatility of stock price (Blankespoor et al., 2014; Clarke & Shastri, 2000; Leuz & Verrecchia, 2000; Wang, 1993; Yoon et al., 2011). Due to uniformity in the information provided to investors, these proxy variables help to judge the effect of information asymmetry on the capital market as information asymmetry is negatively associated with the trading volume of the market and positively related with the bid-ask spread and volatility of the stock price. Trading volume has been extensively used to measure the efficiency of the market (Antoniou et al., 1997; Brown Jr. & Fernando, 2011; Liu et al., 2017; Seyhun, 1986). So, in the present study, trading volume has been taken as the proxy variable to study the impact of XBRL adoption on information asymmetry. The study is focused on the pre-and post-adoption XBRL effect on information asymmetry on the one hand and finding the impact of adopting XBRL on reducing the information asymmetry, which is measured by taking the trading volume of the Indian capital market as a proxy variable, on the other hand. For the purpose of the current study, the data has been taken for a period of 20 years, from the years 2001–2020, taking 11 years before the adoption of XBRL and 9 years after the adoption.

The Indian corporate sector started adopting XBRL in the year 2011, but as per the Ministry of Corporate Affairs (MCA Circular 37/2011), it was not mandatory for companies of the financial and power sectors to compulsorily adopt XBRL. Thus, for the purpose of the current study, although a full list of 500 companies was taken from the Nifty 500 index of NSE as of May 26, 2020, the companies under these two sectors were not taken into consideration. The total number of companies in these two sectors on that date was 150, due to which the sample size was reduced to 350 companies. Apart from this, to take pre and post-adoption XBRL data of companies, the companies that were not incorporated in the pre-adoption period, i.e., 60 in number on the said date, were also removed, and the net sample size came out to be 270. The data were collected through the Capitaline database. Apart from trading volume, four other variables, that is, turnover, firm size, volatility, and stock price, affected by information asymmetry (Easley et al., 2002; Lakhal, 2008; Leuz & Verrecchia, 2000; Liu et al., 2017; Yoon et al., 2011) have been taken under the study. To study the pre and post-adoption XBRL effect on these five variables, the paired *t*-test has been applied. Mean scores of these parameters pre and post-adoption of XBRL have been compared through paired *t*-tests to find out the statistical difference between these scores. Based on the review of previously available literature, the following hypotheses have been proposed.

- **Ha1 :** There is a significant difference between mean scores of trading volume in the pre-and post-adoption period of XBRL.
- **Ha2 :** There is a significant difference between mean scores of turnover in the pre-and post-adoption period of XBRL.
- **Ha3 :** There is a significant difference between mean scores of firm size in the pre-and post-adoption period of XBRL.
- **Ha4 :** There is a significant difference between mean scores of volatility in the pre-and post-adoption period of XBRL.
- **Ha5 :** There is a significant difference between mean scores of the stock price in the pre-and post-adoption period of XBRL.

The other part of the study has focused on examining the impact of XBRL adoption on reducing the information asymmetry. Apart from XBRL, there are various other parameters of the capital market that affect the trading volume, which include turnover, firm size, volatility, and stock price (Kumar et al., 2019; Lakhal, 2008; Leuz & Verrecchia, 2000; Liu et al., 2017; Yoon et al., 2011). Thus, these other variables are taken as control variables. XBRL is taken as the independent variable, and trading volume, which is taken as a proxy measure for information asymmetry, is the dependent variable. A negative relationship exists between information asymmetry and the trading volume of the market, as the increase in information asymmetry leads to a decrease in trading volume due to imperfect information disclosure by the corporate sector in the market. Multiple regression analysis techniques have been applied to determine the impact of adopting XBRL on the trading volume of the Indian capital market. The study proposes a model (1) in which trading volume is a function of XBRL, and the other variables are considered as control variables:

$$Trading\ Volume = f(XBRL, \text{control variables}) \quad (1)$$

$$Trading\ Volume_{it} = \beta_0 + \beta_1 XBRL_{it} + \beta_2 Volatility_{it} + \beta_3 Turnover_{it} + \beta_4 Firm\ Size_{it} + \beta_5 Stock\ Price_{it} + \mu_{it} \quad (2)$$

where, *i* refers to firm and *t* refers to either the pre-adoption or post-adoption period.

↳ **Ha6 :** Adoption of XBRL reduces information asymmetry in the Indian capital market.

Analysis and Results

Table 1 reveals the paired sample correlations, and Table 2 shows the descriptive statistics as well as the comparison of sample means for all the variables taken under study for the pre and post-adoption period.

The results of the panel unit root test are depicted in Table 3. In order to check the stationarity of data, further panel unit root tests have been applied. Basically, two kinds of panel unit root tests are used. Common unit root test indicates that there are common persistent parameters across the cross sections. When there is no constant mean-variance and auto-covariance at various lags over time in a data series, it is known as non-stationary data (Dixit & Jain, 2023; Mwambuli, 2015). By making this assumption, Levin, Lin, and Chu (LLC) (2002) were able to create a standardized procedure for finding the unit root. Conversely, a unit root process is said to be individual if the persistent parameters are not shared and instead vary randomly over the cross-section. By using this assumption, the individual unit root test has been developed by Im, Pesaran, and Shin (IPS) (2003), Fisher-ADF, and Fisher-PP. The results of both the tests, individual and unit root tests, have been reported in Table 3.

The results of the Hausman test for trading volume are depicted in Table 4. In order to select an appropriate model amongst the fixed effect and random effect models for trading volume, the Hausman test has been applied.

Table 1. ***Paired Samples***

		N	Correlation	Sig.
Pair 1	Pre- and post-adoption Firm Size	312	.803	.000
Pair 2	Pre- and post-adoption Trading Volume	312	.805	.000
Pair 3	Pre- and post-adoption Turnover	312	.747	.000
Pair 4	Pre- and post-adoption Volatility	312	.502	.000
Pair 5	Pre- and post adoption Stock Price	312	.671	.000

Table 2. ***Descriptive Statistics and Comparison of Sample Means (Paired Samples t-test)***

Variables	Pre-Adoption Period (2000–2010)				Post-Adoption Period (2011–2020)							
	Avg	*N*	Std. Deviation	Std. Error Mean	Avg.	*N*	Std. Deviation	Std. Error Mean	*df*	Mean Difference	*t*-statistic value	*t*-test value
Firm Size	3.269	31	.67835	.03840	3.884	31	.55304	.03130	31	.615	–26.87	.000
Trading Volume	6.416	31	.82995	.04698	6.789	31	.82679	.04680	31	.372	–12.73	.000
Turnover	5.784	31	.83267	.04714	6.391	31	.66896	.03787	31	.606	–19.28	.000
Volatility	.2351	31	.06148	.00348	.1768	31	.04013	.00227	31	–.058	19.07	.000
Stock Price	1.954	31	.51068	.02891	2.513	31	.56485	.03197	31	.559	–22.51	.000

Note. Firm Size is the average of a firm's market value (Market capitalization). The amount of security traded in a given period is trading volume. Turnover is calculated by dividing the trading volume by the total number of respective companies' total number of shares, reflecting the degree of trading activity. Volatility is calculated as the difference between the highest and lowest prices for a given month, which is then divided by the average of those two prices. Stock Prices are the average monthly closing price.

**p*-values are significant at 5% as well as 1% levels of significance.

Table 3. ***Panel Unit Root Test for Stationarity***

Variables	Individual Unit Root Test				Common Unit Root Test	
	Augmented Dicky – Fuller Fisher's Chi-Square		PP Fisher's Chi-Square		Levin, Lin, & Chu	
	Statistics	*p*-value	Statistics	*p*-value	Statistics	*p*-value
Firm Size	30870.5	0.000*	–168.169	0.000*	–4.95	0.000*
Turnover	2008.05	0.000*	–22.0625	0.000*	–17.80	0.000*
Trading Volume	3196.33	0.000*	–34.6253	0.000*	–25.089	0.000*
Volatility	14354.8	0.000*	–105.932	0.000*	–98.774	0.000*
Stock Price	26955.7	0.000*	–151.217	0.000*	–155.4	0.000*

Note. Null Hypothesis: Unit Root, *At 0.01 level, test values are significant, ** Computation of Fisher's test probabilities by using chi^2 distribution. The other tests assume normality.

Table 4. ***Hausman Test for Trading Volume***

Variable	Fixed	Random	Var (Diff.)	Prob.
XBRL	0.184427	0.182748	0.000000	0.0000
Volatility	0.051924	0.054122	0.000000	0.0000
Turnover	1.000717	1.001004	0.000000	0.0510
Firm Size	–0.632810	–0.630123	0.000000	0.0000
Stock Price	–0.000027	–0.000028	0.000000	0.0000

Note. Ho : The difference in coefficient is not significant and the random effect model is appropriate.

Ha : The difference in coefficient is significant and the fixed effect model is appropriate.

Chi^2 (5) = 414.59; Prob. = 0.000.

Table 5. ***Results of the Fixed Effect Model***

	Dependent Variable : Trading Volume					
Variable	Correlation	Coefficient	VIF	Std. Error	*t*-statistics	Prob.
C		2.696329		0.008571	314.5716	0.0000
XBRL	0.254314	0.184427	1.258883	0.002769	66.60871	0.0000
Volatility	0.044589	0.051924	1.254921	0.009973	5.206395	0.0000
Turnover	0.848401	1.000717	1.053419	0.002353	425.2052	0.0000
Firm Size	0.579831	–0.632810	3.757989	0.004066	–155.6415	0.0000
Stock Price	–0.116069	–2.73E-05	4.321384	5.40E–07	–50.51268	0.0000
R-squared	0.938927	*F*-statistic		3080.729		
Prob(*F*-statistic)	0.000000	Durbin–Watson		1.946678		
Adjusted *R*-squared	0.938622					

Note. *Values are significant at the 0.05 level.

Table 5 depicts the results of the fixed effect model, which has been applied to find out the impact of XBRL adoption on the trading volume of the Indian capital market.

Discussion

Paired Samples Correlation Test

The paired samples correlations depict that pre- and post-adoption scores of all the variables are significantly and strongly positively correlated (r = .803, .805, .747, .502, and .671, p<.01).

Descriptive Statistics of Paired Sample t-test

The results depicted in Table 2 of paired sample *t*-test show that there is a statistically significant average difference between the pre and post-adoption mean scores of all the variables, that is, firm size scores (t_{311} = –26.87, p< 0.05, and 0.01), trading volume (t_{311} = –12.73, p<0.05, and 0.01), turnover (t_{311} = –19.28, p <0.05, and 0.01), volatility (t_{311} = 19.07, p<0.05, and 0.01), and stock price (t_{311} = –22.51, p < 0.05, and 0.01).

On an average, post-adoption trading volume, stock prices, turnover, and firm size are .372, .559, .606, and .615 points higher than the pre-adoption while post-adoption volatility is .058 points lower than the pre-adoption volatility, resulting in acceptance of Ha1, Ha2, Ha3, Ha4, and Ha5. It indicates that with XBRL adoption, firm size, trading volume, turnover, as well as stock prices have increased while the volatility, which reflects the risk factor, has been reduced due to a decrease in information asymmetry. It further reflects that the adoption of XBRL, which leads to a decrease in information asymmetry, is helpful in increasing firm size, trading volume, turnover, and stock prices and reducing the risk involved.

Panel Unit Root Test

As revealed in Table 3, the panel unit root test indicates that all variables under study, that is, firm size, turnover, trading volume, volatility, and stock price, are stationary. At a 0.01 significance level, the null hypothesis has been rejected for all the variables used in the study. The LLC results indicate that all variables under the study are stationary, both at the individual intercept as well as at the individual trend.

Hausman Test for Trading Volume

The above results from the Hausman test run emphasize the use of the fixed effects model since prob. (Chi^2) <0.05 indicate that the difference in coefficient is significant. Therefore, for this study, the results from the fixed-effects model are used to establish the correlation between the dependent variable (trading volume) and independent and control variables, that is, XBRL, size of the firm, turnover, stock price, and volatility.

Regression Analysis

In order to study the impact of adopting XBRL on the information asymmetry of the Indian capital market as per eq. (1), multiple regression analysis has been applied by assuming that the variables under study are normally distributed due to the large sample size and by the logarithmic transformation of data. To check the multicollinearity in the data, correlation coefficients and VIF values have been examined, and values of VIF for all the variables being less than 10 depict that there is no multicollinearity in the data.

The results of the fixed effect model in Table 5 reveal that all the variables under the study show a significant impact on the trading volume at a 1% significance level, as the p-value is less than 0.01 for all the variables. The results further depict that the regression model significantly determines the trading volume (F - ratio = 3080.729)

and five independent variables, which include XBRL adoption, size of the firm, volatility, stock price, and turnover rate, and explains 93.86% of the variation in trading volume (Adjusted $R^2 = 0.9386$).

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The regression coefficient for adopting XBRL is .184 and has a significant relationship with trading volume (*p*-value = 0.00), resulting in the acceptance of Ha6. It indicates that by adopting XBRL, information asymmetry has been reduced, leading to an increase in the trading volume (Luo et al., 2023). Similarly, regression coefficients for volatility and turnover (.05 and 1, respectively) are also significantly related to trading volume and increase in volatility, that is, risk and turnover increase the trading volume. Opposite to this, firm size and stock price both have a significant (*p*-value less than 0.01) but negative impact (regression coefficients, i.e., –.063 and –.273E–05, respectively) on trading volume, indicating that the increase in firm size and stock price lead to a decrease in trading volume.

Conclusion and Implications

The level of corporate disclosure determines the faith of stakeholders and thus affects the level of investment in a particular market. It is a well-known fact that transparency in the corporate world provides a healthy environment to the existing as well as potential investors of an economy so that these well-informed investors can invest in the capital market with confidence. Web-based corporate disclosure is one of the important measures to enhance the level of information symmetry so that a formal platform can be provided to the investors to build faith in these market movements. The current research was undertaken within the setting of the Indian capital market, and it analyzes how the reduction in information asymmetry brought about by the adoption of XBRL by the Indian capital market has affected trade activity. It is noticed that XBRL adoption is positively associated with information asymmetry, even after accounting for confounding factors, including firm size, turnover rate, volatility, and stock price. The study concludes that the adoption of XBRL by the Indian corporate sector helps in reducing information asymmetry on the one hand and thus significantly affects the trading volume of the Indian capital market on the other. The study has various implications with regard to the updating in the regulatory framework of capital markets in developing countries like India. By facilitating the flow of savings into productive investments for the expansion of trade and industry, a country's capital market contributes significantly to the growth of the economy as a whole.

An effort has been made through this study in finding the relation between the information asymmetry and trading volume of the Indian capital market so that suitable platforms like XBRL can be provided by market regulators and policymakers to minimize the information asymmetry in the market, which can boost the investment level of an economy by developing the faith of investors on the trade of market. The adoption of XBRL

helps in reducing information asymmetry, increasing the valuation of companies, and lowering the cost of capital. Listed firms can provide XBRL-enabled applications and services to their stakeholders for increasing investments. Regulatory authorities can also enable companies to disclose reports that are useful for decision-making to various stakeholders according to the XBRL taxonomy and can also assist the managers of the companies in understanding the effective implementation of the XBRL taxonomy, which will create their confidence resulting in the long-term benefits of the business. This study appends the literature on digital reporting language (XBRL) and information asymmetry. This study provides a general structure and framework for the research topic, which will be useful to researchers and students. This research contributes to the existing body of literature by offering new empirical data for the benefits of guiding the implementation of XBRL in the Indian context. It also examines the impact on the Indian capital market, which is relatively lesser studied in the Indian context.

Limitations of the Study and Scope for Further Research

A sample of Indian-listed companies has been used in this research. Findings from these Indian businesses may only be extrapolated to businesses with comparable disclosure quality prior to XBRL adoption, comparable financial reporting conditions, and comparable technology development environments. Furthermore, not all potential indicators of information asymmetry are examined in this research. To evaluate the effect of XBRL on information asymmetry, future studies might employ more information asymmetry proxies. Future studies should compare the conclusions drawn using the suggested approaches to those reached using other methodologies. And last, XBRL is continuously being developed and enhanced in India. Future studies may examine its impact using more current data, which may also take into account the effects of COVID-19 and the convergence with IFRS.

Authors' Contribution

Dr. Sushant Gupta conceived the presented idea and encouraged Ajay Chandel and Dr. Lalit Bhalla to investigate this topic. Ajay Chandel and Dr. Lalit Bhalla were involved in data collection and writing the literature review. Dr. Sushant Gupta contributed to the analysis of the results. All the authors discussed the results and contributed to the writing of the final manuscript.

Conflict of Interest

The authors certify that they have no affiliations with or involvement in any organization or entity with any financial interest or non-financial interest in the subject matter or materials discussed in this manuscript.

Funding Acknowledgement

The authors received no financial support for the research, authorship, and/or for publication of this article.

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