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## Do XBRL filings enhance informational efficiency? Early evidence from post-earnings announcement drift

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### ABSTRACT

In 2009, the Securities Exchange Commission (SEC) mandated public firms to file their financial statements using eXtensible Business Reporting Language (XBRL). The SEC's main motive behind this mandate is that XBRL filings would enhance the informational efficiency in the stock markets by making financial data easier to use and analyze for a broad range of investors. Using a sample from the first wave of mandated XBRL filers, we find a decline in post earnings announcement drift for the good news portfolio in the post-XBRL adoption period. Instead of a drift associated with underreaction, we find that markets overreact to negative earnings surprises for the bad news portfolio during our observation period, which coincides with the financial crisis. We detect limited evidence that XBRL adoption mitigates overreaction, which is another form of market inefficiency. We also find limited evidence that XBRL particularly benefits small investors.

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### 1. Introduction

On January 30, 2009, the SEC released a final rule requiring public companies to provide their financial statements to the Commission and on their corporate websites in interactive data format using the eXtensible Business Reporting Language (henceforth, XBRL). XBRL is a new Internet based document language for business and financial reporting purposes that will soon replace the Hyper Text Markup Language (henceforth, HTML) that has been broadly used in EDGAR filings of 10K or 10Q for almost 20 years. The main advantage of XBRL data over HTML data is that the former is computer readable.

The SEC and proponents of XBRL claim that XBRL will eliminate costly manual collection, facilitate processing of financial information, and make the information easier to analyze by investors (AICPA, 2012; Efendi, Park, & Subramaniam, 2011; Efendi, Smith, & Wong, 2011; Gray & Miller, 2009). A working group of the American Accounting Association's Information System and Artificial Intelligence/Emerging Technology Sections examined the prospects of XBRL and concluded that XBRL would be vital to market democratization (Debreceeny et al., 2005). Mandatory XBRL reporting would benefit a broad range of investors because it provides everyone an access to computer readable financial information in a timely manner at no cost. These proposed benefits suggest that XBRL would enhance the

usefulness of financial data and thus improve informational efficiency in the capital markets.

This study seeks to answer the research question: Do XBRL reports increase the information efficiency in the capital markets? Specifically, we measure the degree of informational efficiency in the capital markets with the tendency of post-earnings announcement drift (henceforth, PEAD). PEAD is described as a market anomaly that stock return drifts in a positive (negative) direction subsequent to a positive (negative) earnings surprise. Earnings surprises arise when the reported earnings are above or below benchmarks such as analyst forecast amount or previous period amount. PEAD has been one of the longest surviving market anomalies since it was first documented by Ball and Brown (1968).

### 2. Past related research

Numerous studies have documented post-earnings announcement drift. These studies have revealed that the market's informational inefficiency is one main factor for PEAD (e.g., Bernard & Thomas, 1989; Bhushan, 1994; Freeman & Tse, 1989). With regard to the role of information technologies (IT), Asthana (2003) documents that the general advancement in IT during the 1990's has significantly reduced PEAD. He posits that the advancement in information and communication technologies have driven down the cost of information search, production, storage and dissemination. In addition, the emergence of Internet based brokerage (such as E\*Trade, Ameritrade, etc.) has lowered the transaction costs of stock trading.

In the spirit of Asthana (2003), this study examines the effect of a specific advancement in information technology, in this instance the

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adoption of XBRL and its effect on PEAD. XBRL would make financial information easier to retrieve and analyze for a broad range of investors and thus could enhance informational efficiency. If XBRL filings do enhance informational efficiency in the capital market, the tendency of PEAD would be significantly reduced after XBRL filings. Nevertheless, the proposed benefit may not materialize for two reasons. First, [Debreceeny, Farewell, Piechocki, Felden, and Graning \(2010\)](#) identify computational errors in mandatory XBRL filings. Next, the lack of assurance requirement on XBRL filings has a negative consequence to the quality of these reports ([Boritz & No, 2009](#); [Plumlee & Plumlee, 2008](#)). These issues on quality could potentially impede the expected role of XBRL reports to curb PEAD and enhance informational efficiency. We state our hypothesis in an alternative form as follows:

**H1.** Post-earnings announcement drift (PEAD) would be reduced after firms file their financial statements by XBRL format.

Using a sample of 7619 firm-quarter observations from 474 first mandatory XBRL filers which are required to file XBRL reports for quarterly or annual fiscal period ending on or after June 15, 2009, we find evidence that PEAD declines after XBRL reports become mandatory. Our results of the decrease in the drift are particularly strong for the good news portfolio. Previous studies show that the magnitude of the drift is directly related to the magnitude and sign of unexpected earnings, and the absolute magnitude of the drift is inversely related to firm size. Thus, in the multiple regression setting, we include firm size and the magnitude of unexpected earnings as control variables. We find that PEAD for the good news portfolio decline significantly with XBRL reports. Instead of a drift associated with underreaction, we find that markets overreact to negative earnings surprises for the bad news portfolio during our observation period, which coincides with the recent financial crisis period ([Hausman & Johnston, in press](#)). We detect limited evidence that XBRL adoption mitigates overreaction, which is another form of market inefficiency. This latter finding should be interpreted cautiously pending further analysis and/or supporting evidence from related research.

Our study is important because we present empirical evidence that XBRL adoption has a positive effect on information efficiency in the capital markets. The results should be of particular interest to the SEC and its registrants. For years, the SEC has been promoting and pushing for the adoption of XBRL. Furthermore, companies have invested resources to learn and to implement this new reporting technology in order to comply with the recent SEC mandate. The results provided in this study could help justify the effort and investment made in adopting XBRL. We contribute to a new area of research literature examining the empirical relationship between XBRL and capital markets. To our knowledge there are three papers available in this area. Using the sample of XBRL voluntary filings, [Efendi, Park, et al. \(2011\)](#), [Efendi, Smith, et al. \(2011\)](#) find that XBRL reports have incremental information content beyond HTML reports as evidenced by price reaction when XBRL reports are published. Using the sample of XBRL mandatory filings, [Yoon, Zo, and Ciganek \(2010\)](#) and [Kim, Lim, and No \(2012\)](#) demonstrate that XBRL mandatory filings significantly mitigate information asymmetry in the capital market.

The rest of the paper is organized as follows. [Section 3](#) presents our research methodology including the sample selection process and research design. [Section 4](#) reports the empirical results. Finally, [Section 5](#) concludes the paper.

### 3. Research methodology

#### 3.1. Sample selection

According to the SEC's rule, the timing of mandatory XBRL filings varies with the phase-in groups. [Table 1](#) shows the description of each Phase-in group and the starting period of mandatory XBRL filings. Our sample consists of firms in the Phase I group. The group includes

**Table 1**  
Phase-in groups for mandatory XBRL filings.

Group	Group description	XBRL requirement
Phase I	Domestic and foreign large accelerated filers that use U.S. GAAP and have a worldwide public common equity float above \$5 billion as of the end of the second fiscal quarter of their most recently completed fiscal year	Quarterly or annual fiscal period ending on or after June 15, 2009
Phase II	All other domestic and foreign large accelerated filers that use U.S. GAAP	Quarterly or annual fiscal period ending on or after June 15, 2010
Phase III	All other remaining filers that use U.S. GAAP	Quarterly or annual fiscal period ending on or after June 15, 2011

domestic and foreign large filers that use U.S. GAAP and have a worldwide public common equity float above \$5 billion. The SEC does not provide a list of firms included in the Phase I group, so we determine the preliminary group of mandatory XBRL filers based on the description of the Phase I group. To do so, we retrieve from COMPUSTAT database the total number of outstanding common shares for all firms and their stock prices at the end of the second fiscal quarter of their fiscal year most recently completed prior to April 13, 2009, which is the effective date of the SEC's rule. From this initial sample, we delete firms with public common equity float less than \$5 billion.

Variable definitions are provided in [Table 2](#). [Table 3](#) shows the number of sample firms included in the preliminary group from COMPUSTAT database is 813. And, the number of all sample firm-quarter observations from 2006 to 2010 for the selected firms is 17,353.

We evaluate the SEC Edgar database to determine whether firms actually filed their financial statements in XBRL format. The SEC Edgar database includes a tag entitled "Interactive Data" on the left side of filing forms if the firms made XBRL filings. If a firm in the preliminary group does not provide XBRL filings, the firm is dropped. Consequently, the number of sample firm-quarter observations (firms) is reduced by 6310 (309). Subsequently, we remove firm-quarter observations with missing data on COMPUSTAT, IBES, or CRSP. Since our data includes a 5-year period, there are instances where a firm covered by a database has some missing quarterly data. For example, with the COMPUSTAT data, we lost 307 firm-quarter observations but we did not lose any firms in the process. Finally, we delete extreme observations from the sample and obtain a final sample of 7619 firm-quarter observations from 474 firms.

The distribution of the sample across industry groups is presented in Panel A of [Table 4](#). Following [Thomas \(1989\)](#) and [Asthana \(2003\)](#), our sample is classified into eight industry groups based on their four digit SIC codes. This industry percentage of sample firm-quarter observations (firms) varies from 2.56 (2.53) percent of the total firm-quarter observations for the construction industry to 29.28 (29.54) percent for the consumer goods industry out of the total firm-quarter observations (total firms).

**Table 2**  
Variable definitions (in alphabetical order).

Variable	Definition
AFE	Analyst forecast error
ABHR <sub><i>i</i> → <i>j</i></sub>	Abnormal buy and hold return from day <i>i</i> to day <i>j</i> relative to earnings announcement date.
LMV	Natural logarithm of MV
MV	Firm's market value at the end of the fiscal quarter (\$ billion)
SUE	Standardized Unexpected Earnings
POSTXBRL	1 for post-XBRL era, 0 for pre-XBRL era
SMALLINV	1 for average daily mean trade size in the 25th percentile, 0 for average daily mean trade size in the 75th percentile.

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