REVIEW OF EARNINGS RESPONSE COEFFICIENT STUDIES

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Abstract

The importance of earnings response coefficient (ERC) research arises mainly from the need to enhance confidence of a firm's stakeholders in accounting information announcements, especially the equity investors, enabling them to make informed stock decisions. Due to the significance of this subject, this paper provides a review of the extant ERC literature and expounds on its evolution and development of the relevant theories, offers perspectives, and highlights the models used since 1968 when the earnings-to-returns relationship first became prominent. The study also evaluates the application of the ERC perspective and highlights the main empirical findings and also elucidates on related research methodologies applied to date and incorporates the relevant explicit and implied critiques. The main research results found while conducting this review supports the relevance of accounting information announcements to stock price formations, and therefore enhancing the confidence of investors and firm's stakeholders in such announcements (Ball & Brown, 1968; Collins & Kothari, 1989; Cheng, 1994; Kothari et al., 2010; Ariff et al., 2011; Hwang & Zhang, 2012; Patatoukas, 2013; Mostafa & Dixon, 2013; Al-Baidhani et al., 2017). Researchers also calculated and evaluated relevant ERCs using different methods such as event study method and regression methods, and applying different approaches such as individual stocks approach and portfolios approach, as detailed in this review. In addition to the enhancement of the stakeholders' confidence in the accounting information, this review paper will be useful to financial accounting standards setters and contributes to a holistic understanding of the literature on earnings-to-returns relationship.

Keywords: ERC, Earnings, Stock Returns, Stock Price

1. INTRODUCTION

This is a review paper of the literature on ERC, which is an ongoing research topic despite its origin in the 1960s. Amongst its various definitions, ERC has been defined as: "a *measure of relation of stock returns to earnings surprises around the time of corporate earnings announcements*"[19] or "t*he relationship between a change in a company's stock price and any unusual statements in a company's earnings announcement*"[20]. ERC is the marginal change in share returns for one unit of unexpected earnings announced as measured over a short or long window. Simply it is the size of stock return response to the size of the earnings announced.

The literature can be traced to Ball & Brown's (1968) seminal contribution when they documented the existence of an statistically significant relationship between earnings and share prices of a sample of United States (US) firms. Considerable empirical research followed thereafter and the sum total of the findings are: (i) that the size of the ERC falls short of the full amount of earnings and (ii) there is perhaps room for investigating what factors are driving the size of the ERC, which to us is more of an important issue if the lack of evidence for a robust response to the earnings size is due to some unknown factor.

Zhang (2014; p. 171), has stated: "Since its inception in the late 1960s, research into the return-to-earnings relation has been pursued primarily along an empirical path. This line of inquiry has been subjected to several stages of development,

[19] Definition is according to http://www.nasdaq.com/investing/glossary/e/earnings-response-coefficient.
[20] Definition is according to http://financialdictionary.thefreedictionary.com/Earnings + Response+Coefficients

each marked by a series of empirical discoveries that enhance our understanding of the usefulness and limitations of earnings in explaining equity returns. However, the emergence of an extensive empirical literature has not been previously accompanied by a parallel process of theoretical development to shed important light on how return should be related to earnings along with other accounting and non-accounting information. We, therefore, have lacked a theoretical framework to unify and integrate the various empirical findings from different studies".

Ball & Brown's original effort has been widely acknowledged[21]. They applied the standard event study method, though it has some statistical deficiency, to focus on the announcement of annual earnings as an important reporting event influencing stock returns[22]. Under a priori reasoning, the next period's earnings is predicted to be the last period's earnings, so that any difference in the next period's earnings is assumed to be the unexpected earnings change, the surprise. Such surprises were postulated in the paper as being correlated with abnormal returns (ARs) of a stock (or much less studied portfolio of stocks).

As at 2015, newer event method procedure has appeared that attempts to correct the deficiencies of the earlier standard method, which requires close attention in any future studies[23]. Ball & Brown categorized their observations into good news (unexpected earnings changes are positive) and bad news (earnings declines therefore likely to have a downward effect on abnormal returns). They found for the US sample a larger negative price effect for bad news and a smaller price effect for good news. This finding has been verified for so many other markets that the ERC is generally considered as a part of the accounting paradigm in research literature.

The relationship between a firm's stock market value and accounting data has been studied by many other researchers. Feltham & Ohlson (1995), contend that the book value should be the same as market value. Their claim led to the famous stand that accounting statements are value relevant for stock price formation! However, in reality, market values differ considerably from book values, as has been noted by equally persuasive researchers. The extent to which the size of the ERC is closer to the suggested value of 1.00 if the book value is equal to the market value also depends on the nature of the operating activities of firms as well as how accountant's measure earnings. We suspect that the size may be different if cash flows are applied instead of earnings based on historical cost and accrual principles.

Based on available evidence that the size of the ERC below 1.00 has led to considerable debate. Thus, there are two opposing opinions about the value relevance paradigm by the accounting profession to extend the ERC literature as full support for the profession that earnings reports are valuable for stock price formation. Indeed, some have argued that it is this value relevance idea as the foundation provides justification for financial accounting standards setting. ERC research is therefore at the core of both academic and professional interests.

Barth et al. (2001)) in their view, explain the value relevance literature and evaluate how well accounting numbers reflect information utilized by investors so as to help in the setting of financial accounting standards. They contend that equity investment is a primary focus of financial statements obsessed with net worth, and that any other uses of such statements do not minimize the significance of the value relevance for the stockholders' use of such information. The current valuation model(s) can therefore be applied to address value relevance questions. They also maintain that value relevance research addresses econometric issues that otherwise could limit inferences from such research, so that the value relevance issue could well benefit from using econometric approaches.

Conversely, researchers such as Holthausen & Watts (2001) critically assess the standard-setting inferences that can be drawn from existing evidence. The researchers argue that the theories of accounting, standard setting and valuation, all of which underlie these inferences, are not descriptive of accounting, nor standard setting or valuation to justify the claim for standard setting. They concluded that it is difficult to draw justification for such standard-setting because there is limited evidence on the relationship between accounting amounts reported as earnings and the size of the actual change in the common stock price in the market.

Our review supports a view that accounting information is useful to equity investors as well as to the financial accounting standards setters only if future research could help to refine prior findings to achieve a stronger relationship between earnings size and the ERC. Our review leads on to explore if other-than-earnings measure is appropriate and that there could be some missing factor(s) that are highly correlated relative to the often-utilized earnings.

The rest of this review is organized as follows: Section 2 contains a summary of related prior research showing a review of empirical evidence as regards relevance of accounting information to stock price formations. Section 3 presents the theoretical ideas, perspectives, and models behind the ERC concept. Section 4 reveals the results, findings, and insights of ERC empirical research. Section 5 offers a summary of our review. Section 6 states our conclusion and suggestions for future ERC research.

2. LITERATURE REVIEW

Research over the past four decades resulted in the cumulative knowledge, which is generally found under the topic of ERC as a favorite topic of continued interest in accounting-cum-finance literature. In this section we provide a brief review relevant to this topic.

2.1. Theories and Perspectives

According to Ball & Brown (1968), the argument during the period 1929-1967 was based on the

[21] In 1986, Professor Brown and Professor Ball both received the AAA's (US accounting body) inaugural award for this article's seminal contributions to accounting literature and are credited with having laid the foundation for much of modern accounting literature.

[22] The method itself was borrowed from agricultural science, where event-based interventions have long been studied using the intervention as events to study how plants respond to various treatments. Philip Brown was familiar with this method from his undergraduate days in Australia.

[23] It is justifiably claimed that the volatility changes around the time of announcement of earnings would introduce volatility-induced errors in the standard errors, which should be corrected.

shortcoming of the evaluation method, that earnings amounts cannot be defined substantively as they lack meaning and hence their utility is doubtful. They added that accounting theorists in general assessed the accounting practices during that period according to the agreement of such practices with a particular analytical model which is based either on a developed argument or just a few untested assertions.

In order to overcome the above shortcoming of the evaluation method, Ball & Brown (1968) made a first attempt to document the relationship between earnings and share price in the US stock exchange. They applied the standard event study method from life sciences to focus on the announcement of annual earnings as an important reporting event that may influence stock returns. They utilized two different proxies in regard to expected earnings: under a priori reasoning to predict next period's earnings as the difference between the current and the past, and that the earnings surprises correlate with the abnormal returns of a stock (or a portfolio of stocks).

Newer event method has appeared in recent years to correct the deficiencies of the standard method. Ball & Brown (1968) categorized earnings changes into good news (earnings observations that are increases as having a positive effect on abnormal returns) and bad news (as observations of having a downward effect on stock returns). They reached definite conclusion meaning that the content of all the information about an individual firm is considerably useful.

However, the annual report cannot be considered as a timely medium since most of its content is captured by interim reports, which appear to be more critical for price formation, in subsequent studies. They also found that the market responds to data sources other than annual income reports. They attribute in their study some evidence on the average price movements of entities for good and bad news groups. For this original effort, they received the above-mentioned AAA's inaugural award.

More than two decades later, Ohlson (1990) reviewed and synthesized the finance valuation literature on firms' evaluation using accounting data. He criticizes the uncertainty, multiple dates, and inter-temporal consistency of the theory's models. He argues that there are a number of shortcomings in the relevant theoretical constructs used in much of the previous studies, mainly due to the non-recognition of the basic fact: "the price of a security is determined by the present value of its dividends, and every valuation function satisfies inter-temporal consistency requirements to exclude arbitrage opportunities" (Ohlson 1990; p673).

After a period of being ignored, the positive accounting theory was resurrected again in 1990. Following the publication of their two papers in 1978 and 1979, Watts & Zimmerman (1990) propose three ways to improve theory. First, the major improvement is to establish a tighter link between the theory and empirical tests. A second improvement is the development of appropriate models that identify the endogeneity among the regression variables. Third is to attempt to assess models which help to decrease measurement errors.

In a similar context, two decades later Kothari et al. (2010) reviewed the positive theory of the American generally-accepted accounting principles (GAAP). They argue that this theory provides a theoretical framework that predicts how GAAP addresses the performance measurement and stewardship challenges that form the nature of the two primary financial statements, the income statement and the balance sheet. Using the theory, they also compared and contrasted existing regulated GAAP with GAAP that would be shaped by market forces. They reasoned that verifiability and conservatism are important features of a would-be-shaped GAAP. Although they recognize the benefit of using fair values on observable prices in liquid secondary markets, they warn against generalizing such fair values to include financial reporting information fully. They concluded that competition between the American FASB (Financial Accounting Standards Board) and the International IASB (International Accounting Standards Board) would give GAAP a better chance to respond to market forces appropriately.

Disagreeing with his predecessors, Watts (1992) summarizes the accounting choice theory and related market-based research evidence, arguing that the theory and evidence indicate that accounting choice varies with firm's variables used such as growth, gearing, etc. Hence, he contends that this theory provides hypotheses for the relationship between ERC and gearing.

Two years later and to advance previous studies that applied a general valuation model, researchers attempted different formats about the relationship between earnings and returns. Cheng (1994) established a theoretical framework, providing an illustration of a step-by-step process that shows how this earnings-to-returns relationship can be formally modeled. He argues that an appropriate empirical research design can be successfully achieved only after fully understanding the theoretical model.

The theory of accounting conservatism was effectively utilized by Roychowdhury & Watts (2007) to examine the relationship between two conservatism measures: asymmetric timeliness of earnings and the ratio of market value to book value of equity. The relationship between this ratio's end-of-period and asymmetric timeliness is positive when the timeliness is measured cumulatively over long periods. Meanwhile, such relationship is negative when asymmetric timeliness is measured over short periods due to reliance on measures on beginning-of-period composition of equity value. Essentially, asymmetric timeliness measures conservatism more efficiently when it is utilized cumulatively over a number of periods.

A few years later, Ball et al. (2013) connected conservatism theory to the use of accounting information and stated that financial reporting has been supported with new insight through the conditional conservatism concept. The cross-sectional correlation between the expected component of returns and earnings bias estimates of the way earnings incorporate accounting information contained in returns (e.g., timeliness). This correlation depends on the size of returns, biasing asymmetric timeliness estimates. They consider firm-specific effects and conclude that (1) estimates do not show the bias, they are economically and statistically significant (although smaller in magnitude), (2) are consistent with prior estimates, and (3) behave as a predictable function of size, leverage, and market-to-book.

In order to determine the relevance of earnings and book value on stock prices, Dimitropoulos &

Asteriou (2010) found that book values are relevant only when they are combined with earnings in the OLS regression model. The effect of speculative intensity on the relevance of accounting information has a significant positive effect on share prices while the value relevance of book values and earnings has not changed even after controlling for speculation. In a similar context, Ohlson (2014) reveals that expected reported earnings for the next period are the same as stock price regardless of the transitory noise in reported earnings.

In questioning whether a torpedo effect exists, Payne & Thomas (2011) attempt to determine whether there is an extra market penalty for barely missing an earnings threshold After all, stock market reaction to announced earnings that barely miss earnings thresholds (i.e., prior period earnings, zero earnings, and analyst forecasts) does not provide consistent evidence of an extra market penalty for barely missing an earnings threshold. In other words, there is little evidence of such a torpedo effect.

The relationship between earnings and returns on disclosure window sizes has been an added feature. For example, Maditinos et al. (2013) found that there is a significant relationship between earnings and returns on the length of the windows of one year and more. Use of cumulative model where earnings were aggregated up to four years yielded higher coefficients. Contrarily, they found low ERCs if short measurement windows of up to three quarters are applied.

Moreover, the effect of new information, such as cash flows and discount rates on stock price reveals that there is a correlation between new information about cash flows and discount rates, and earnings changes at the stock market level (Patatoukas, 2013). New information in aggregate earnings changes co-vary positively and have offsetting effects on share market prices. Overall, his study asserts the relevance and informativeness of accounting earnings for stock valuation at the market level.

As regards investors' reaction to earnings announcement, Kwag (2014) recently found that investors become more active during the earnings announcement period, placing a discount on optimistic earnings forecasts. He contends that investors are expected to be provided with more relevant and quality information pursuant to the 1999 U.S. Regulation Fair Disclosure. He also found that investors do try to correct their own mis-adjustments during the post-announcement period.

Table 1 below summarizes the evolution and development of theories, perspectives, and models used with respect to the ERC since 1968 when the earnings-to-returns relationship was first documented.

In his evaluation of the literature on return-to-earnings relationship, Zhang (2014) notes that this relationship has been continued primarily through empirical studies resulting in considerable research findings that improve understanding of the benefit and shortcomings of earnings in explaining stock returns. However, he added that this empirical research has not been accompanied by the matching theoretical development that can explain the way that returns are related to earnings together with other relevant accounting and non-accounting information.

Table 1. Theories, perspectives, and models

Theory, Perspective, or Model	*Researchers*
Event Study Method	Ball & Brown (1968)
Security / Finance Valuation Theory	Ohlson (1990)
Positive Accounting Theory	(Watts & Zimmerman, 1990; Kothari et al., 2010)
Accounting Choice Theory	Watts (1992)
General Valuation Model	Cheng (1994)
Accounting Conservatism Theory	Roychowdhury & Watts (2007)
Connecting conservatism theory to the use of accounting information	Ball et al. (2013)
Relevance of book value on stock prices	Dimitropoulos & Asteriou (2010)
Disclosure Windows and the Cumulative Model	Maditinos et al. (2013)
Effect of new information about Cash Flow and Discount Rates	(Patatoukas, 2013; Mostafa & Dixon, 2013)
Empirical research has not been accompanied by the matching theoretical development	Zhang (2014)

Therefore, it is argued that researchers are running short of a theoretical framework that would enable them to integrate and unify the empirical findings from these studies.

Table 2 is a summary of key papers on the ERC literature since 1968 and until now:

Table 2. Key papers on earnings response coefficient

ERC Issue	*Researchers*
Evaluation of Accounting Income Numbers	Ball & Brown (1968)
Intertemporal and Cross-Sectional Determinants of ERCs	Kothari et al. (1989)
Economic Determinants of the Relation Between Earnings Changes and Stock Returns	Ball et al. (1993)
Simple Framework for Modeling the Explicit Earnings-Returns Relation	Cheng (1994)
Valuation and Clean Surplus Accounting for Operating and Financial Activities	Feltham & Ohlson (1995)
Valuation Accuracy of the Price-Earnings and Price-Book Benchmark Valuation Methods	Cheng, et al. (2000)
Value Relevance Literature For Financial Accounting Standards Setting	Beaver et al. (2001)
Stock Returns, Aggregate Earnings Surprises, and Behavioral Finance	Kothari et al. (2006)
Asymmetric Timeliness of Earnings, Market-to-book and Conservatism in Financial Reporting	Roychowdhury & Watts (2007)
Another Kind of PEAD: the Pre-Earnings Announcement Drift	Easton, et al. (2009)
Econometrics of the Basu Asymmetric Timeliness Coefficient and Accounting Conservatism	Ball, et al. (2013)
Transitory Noise in Reported Earnings	Ohlson (2014)

2.2. Review of Empirical Literature

Financial statements, which usually come as three main separate statements: income statement, balance sheet, and statement of cash flow, contain information about an entity's activities. The nature of the statements have slowly evolved over the last three centuries by developing a body of rules by professionals and standards setting institutions in order to be prepared in a form that is readable and

understandable. Financial statement users include the entity's directors, shareholders, employees, creditors, financial analysts, and more importantly the potential investors and suppliers who rely on the information contained in the financial statements to make their investment and supply decisions. As stated above, we support the view of Barth et al. (2001) that accounting information is useful to both equity investors and to financial accounting standard setters.

In advancing the debate, Dimitropoulos & Asteriou (2010) found that book values are relevant only when they are combined with earnings in the OLS regression model. They also examined the effect of speculative intensity on the relevance of accounting information, noting it has a significant and positive effect on share prices while the value relevance of book values and earnings has not changed even after controlling for speculation. This study was conducted on 101 non-financial firms listed on the Athens Stock Exchange, which may not be a clean sample for generalization.

In the context of UK firms, Mostafa & Dixon (2013) found that both earnings and cash flow from operations have incremental information content beyond each other. Hence, cash flow information needs to be further studied. Their study revealed that extreme earnings lead to incremental information content for only moderate, rather than extreme, cash flows. They stated that these results are in agreement with results reported in earlier US studies.

Interestingly, Patatoukas (2013) shows that there is a correlation between new information at the stock market level about cash flows, discount rates, and earnings changes. He found that such new information in aggregate earnings changes co-vary positively and have offsetting effects on share market prices. We support such finding and believe that information contained in the statement of cash flow should also be taken into consideration in addition to the other primary financial statements, the balance sheet and income statement, in order to get the best results about the relationship between earnings and equity returns.

In a similar context, investors evaluate earnings persistence in accordance with their reactions to earnings news. Wang (2014) documents that such assessment of earnings persistence is negatively correlated with the income smoothing level after controlling for time-series earnings persistence. Therefore, he proposes that investors feel the non-reality of high persistence of smoothed earnings, and hence discount such persistence when they react to reported earnings.

Despite the majority of accounting research has focused on using income statement information to explain stock returns, some researchers use information from another primary financial statement, the balance sheet. For example, Huang & Zhang (2012) found the balance sheet is incrementally useful for explaining stock returns. Their research shows that each of the three balance sheet-based variables they used has a significant effect that is incremental to those of the earnings variables on stock return. They also found that these variables improved the explanatory power from 11.5% (using earnings-only-based model) to 13.9% (using combined earnings-balance sheet model) in cross-sectional samples of individual firms. We confirm that all relevant accounting information (from the three primary financial statements: income statement, balance sheet, and statement of cash flows) should be utilized to get the best research results about the earnings-to-returns relationship.

Cohen et al. (1980) explained how the correlation in returns and on bias, when measuring a stock's systematic risk, may be attributed to friction that results in the bid-ask spread and price-adjustment lags. They argue that a simple relevant equation provides the framework that fully explains observed phenomena. They also explain how the magnitudes of the different effects relate to a stock market value and to the length of various intervals.

According to Collins & Kothari (1989), researchers applied an event study method or an association study method to study the ERC relationship. The event study method refers to the impact of earnings announcement on investors' decision, on cash flow expectations as investors trade stocks, thereby changing the stock prices based on their interpretation of reported earnings, in the short-run (usually over few days). The association studies relate to such impact in the long-run (normally quarters or years). They found that the ERC is a function of risk-free interest rates as well as the growth, riskiness and/or earnings persistence. They also found that the ERC differs cross-sectionally with the holding period return interval. They argue that their overall results clarify the differential ERC values because of size, adding that the inclusion of the above factors significantly improved the determination of earnings-to-returns relationship. We support the findings and argument of this study in regard to the determination of ERC values when the disclosure window is increased, and the effect of firm size, as one of the major factors that drive the ERC.

Essentially, previous studies show that the relationship between stock returns and earnings increases when return interval increases. Easton et al. (1992), the first researchers to study this aspect, examined the behaviour of operating cash flows and accruals (specifically discretionary and nondiscretionary accruals) in the long-run. They stated that the higher the return interval over which earnings are determined, the lower the measurement errors in aggregated earnings; hence, the association between equity returns and earnings is increased. They showed results supporting their hypothesis: R2s of 63%, 33%, 15%, and 5% for ten-, five-, two-, and one-year return periods respectively.

In the same context, Ohlson & Peng (2006) found that the relationship between equity returns and earnings increases with expansion of the return intervals, evidencing a reduction or even an elimination of the measurement errors in earnings over long periods of time, the results which are in agreement with the majority of previous studies. The R2s averaged 3.4%, 14.6%, 32.9%, and 35.1% for one-, two-, five-, and ten-year return periods, respectively, confirming that the R2s increase as the return windows expand.

In addition, the results of the studies conducted by Olson & Peng (2006), Easton et al. (1992) and others show the measured relationship has low R2 if say a quarterly interval is applied, and hence the association between stock returns and earnings is increased as the intervalling period increases. We agree with these results in regard to

the determination of ERC values when the disclosure window is increased.

Kothari et al. (2006) found that the correlation between earnings and returns is essentially different in aggregate data. They found that returns are not related to past earnings since stock prices have no reaction to aggregate earnings news. They also found that aggregate returns are negatively associated with concurrent earnings; that is, over the last three decades, share prices increased by 6.5 per cent in quarters with negative earnings growth and only by 1.9 per cent otherwise. According to this finding, they propose that earnings and discount rates move concurrently, and that discount-rate shocks explain a considerable proportion of aggregate stock return.

Meanwhile, Easton et al. (2009) found that the quarterly earnings information by early announcers spreads slowly among the late announcers' returns. They also found that the market under-react to the long-run relationship between early and late announcers' quarterly earnings news. They added that the return predictability between early and late earnings announcers could be explained by transaction costs.

Wang (2012) found that investors use analysts' recommendation revisions to re-evaluate the valuation impacts of announced earnings. He also found that the more complex these earnings announcements become, the more important is the role played by the recommendation revisions in helping investors understand the valuation impacts of announced earnings. He reveals that analysts' capability of forecasting the impact of reported earnings on stock valuation maintains a similar position since the implementation of the U.S. Regulation Fair Disclosure of 1999. He also reveals that analysts' expertise in such forecasting expands as the information complexity of such reported earnings intensify. We are in agreement with the findings and arguments of the above studies, and support the view that ERC value increases as the disclosure window expands.

In addition, Ball & Brown (1968) attribute average price movements of entities for good and bad news drive prices. Later studies focused on the factors that may determine the ERC magnitude (i.e., the slope of the return-to-earnings relationship). Zhang (2014) asserts that the factors driving ERC should be generally the same in both short- and long-run studies. Such factors include earnings persistence, financial leverage, growth, earnings quality, and beta (systematic market risk).

Furthermore, firm size has considerable impact on ERC. Since most investors in large firms are better informed about their firms before earnings announcements, large firms are often followed more closely than small firms. Hawawini (1984) reviewed 27 event studies using European data. He noticed that European stock markets are efficient in a semi-strong form, and that European equities anticipate major events quite well similar to the equities traded on the New York Stock Exchange (NYSE). He also noticed that the studies which indicated some inefficiency may have errors due to lack of control for market risk and/or may have failure to neutralize a major firm-size effect.

Collins & Kothari (1989) found that the relationship between earnings and stock returns varies when firm size is used as a proxy for information environment differences. That is, the size of earnings change to price change varies with firm size. However, this attribute, size, is correlated with other attributes, such as growth, risk, and persistence, which may confound any measure of the alleged association between firm size and price response to earnings (Collins & Kothari, 1989; Visvanathan, 2006).

Therefore, there is a size factor in earnings like the one in equity returns, and the size factor in earnings explains the size impact in equity returns. Moreover, stock prices forecast the reversion of earnings growth after firms are ranked according to their size and book-to-market-equity ratios (Fama & French, 1993). We agree with the results and findings of these studies, and think that firm size is one of the major factors that drive the ERC in the European market as well as worldwide.

In particular, according to Visvanathan (2006), there are two earnings quality concepts which are determinants on how investors react to earnings announcements. One concept is earnings persistence' which has been widely investigated by researchers. The other concept is 'earnings predictability which has been examined less often. After controlling for other well-documented ERC determinants, he found that there is an inverse relationship between ERC and the size-adjusted absolute magnitude of the accrual component of quarterly earnings. The result supports the closeness-to-cash property of corporate earnings time series as a valuable ERC determinant. Investors may use the closeness-to-cash earnings profile to inform both interpretations of current unexpected earnings and assessments of earnings quality. That is, earnings that can be deposited directly at the bank or earnings that include a small amount of accruals are considered more corroborative than earnings that consist mainly of accrual components. He suggests that accrual components are of lower quality due to the uncertainty about the realization of these accruals as cash flows in the future.

Ball et al. (1993) used annual earnings and equity returns data and found that there is a significant positive relationship between changes in earnings and changes in equity risk. However, their results show that only a small percentage of changes in earnings are related to changes in risk since the large percentage is related to changes in economic rents (windfall gains and losses). They argue that the leverage impact does not fully offset the impact of investment risk changes.

There are also three balance sheet-related factors, which are profitability change, contemporaneous capital investment, and the previous period's capital investment as being related to stock returns: Huang & Zhang (2012). They found that each of these balance sheet-related variables generally has a significant effect on stock returns. We are in agreement with the findings and arguments of the above studies as regards identifying determinants that drive the ERC. However, in addition to the aforementioned factors, we think there are other factors affecting the ERC value that need to be explored.

Easton et al. (2009) found that quarterly earnings information by early announcers spreads slowly among the late announcers' returns. They reveal the positive relationship between earnings information and return predictability at both individual stock and industry portfolio levels. They argue that such information is helpful for investors

to make large spreads through buying a portfolio with the highest correlation implied returns and selling such portfolio with the lowest correlation implied returns.

Firm size has significant impact on ERC. Collins & Kothari (1989) contend that their results clarify the ERC values on different size, which is considered as a significant factor. The degree of earnings change to price change varies with firm size. However, this attribute, size, is correlated with other attributes, such as growth, risk, and persistence, which may confound the correlation between firm size and price response to earnings (Collins & Kothari, 1989; Visvanathan, 2006).

Fama & French (1993) also argue that there is a size factor in earnings like the one in equity returns, and the size factor in earnings explains the size impact in equity returns. Moreover, stock prices forecast the reversion of earnings growth after firms are ranked according to their size and book-to-market-equity ratios. Meanwhile, Visvanathan (2006) reports an inverse relationship between ERC and the size-adjusted absolute magnitude of the accrual component of quarterly earnings, after controlling for other ERC determinants.

ERC research regarding the above disclosure windows is also extended to include other industries, such as the banking industry. For example, Ariff & Cheng (2011) found that the stock prices of all banking sectors studied are significantly affected by the disclosed earnings information. Similarly, the results of Ariff et al. (2013) show that the stock prices of banking firms, same as those of non-banking firms, react with the unexpected earnings changes at the time of accounting reports. These two studies enhance our understanding of the reasoning behind the difference between stock book value and its market value for non-financial activities while these values stay the same for financial activities.

As stated earlier, Feltham & Ohlson (1995) argue that the book value is the same as market value, supporting the famous stand that financial statements are value relevant for stock price formation! However, this is not the case in reality since market values differ considerably from book values.

In the same context, Cheng & McNamara (2000) maintain that earnings information is more important than book value as a single-number valuator. They found that the price-earnings benchmark valuation approach performs better than the price-book value benchmark approach, and that the combination of both approaches performs better than either one of the above two approaches. A decade later, Dimitropoulos & Asteriou (2010) found that book values are relevant to stock prices only when they are combined with earnings in the OLS regression model. In addition, Ohlson (2014) shows expected reported earnings for the next period are the same as stock price regardless of the transitory noise in reported earnings. In similar context, Ariff & Cheng (2011) and Ariff et al. (2013) found that the stock prices of banking firms, same as those of non-banking firms, are affected significantly by the disclosed earnings information.

Despite the above, research studies on the ERC were conducted only on a small number of countries. For example, Ariff et al. (2013) studied ERCs of banks in eight OECD countries, Denmark, France, Germany, Greece, Italy, Poland, Spain, and Turkey. There are also a limited number of studies on this topic conducted so far relating to the United States, United Kingdom, Malaysia, and other countries. Recently, Al-Baidhani, et al. (2017) studied the ERCs of financial and non-financial firms of Malaysia. Therefore, in order to generalize the findings worldwide, we believe that there should be more international studies especially covering the countries that maintain official and well-organized stock markets.

In addition to the aforementioned evolution and development of the ERC perspective, Table 3 below summarizes the application of this perspective.

Table 3. Application of the ERC perspective

ERC Issue	*Researchers*
ERC values and the Disclosure Windows	(Cohen et al., 1983; Hawawini , 1984; Collins & Kothari, 1989; Easton et al., 1992; Ohlson & Peng, 2006; Kothari et al., 2006; Easton et al., 2009; Wang, 2012)
Factors that Drive ERC	(Ball & Brown, 1968; Zhang, 2014; Collins & Kothari , 1989; Visvanathan, 2006; Fama & French, 1993; Ball et al., 1993; Huang & Zhang, 2012)
Individual Stocks and Portfolio Setting	Easton et al. (2009)
ERC sizes in Portfolio Setting	(Collins & Kothari , 1989; Visvanathan, 2006; Fama & French, 1993)
Stock Book Value versus Stock Market Value	(Ariff & Cheng , 2011; Ariff et al., 2013)
Difference in the Ratio Share Market Price to Book Value	(Feltham & Ohlson, 1995; Cheng & McNamara, 2000; Dimitropoulos & Asteriou , 2010; Ohlson , 2014; Ariff & Cheng, 2011; Ariff et al., 2013)
OECD Multi-Country Differences	Ariff et al. (2013)

3. RESEARCH METHODOLOGY APPLIED

The considerable empirical evidence of a positive relationship between the changes in unexpected earnings announcements and changes in respective stock prices has led to the establishment of the accounting theory on ERC (Ariff et al., 2013). Hence, most ERC studies are based on this theory, applying the relevant quantitative methods.

Grouping the data into portfolios mitigates the problem of "errors in variables" (Beaver, 1968; Ariff et al., 2013). Hence, it is advisable to group research data into different portfolios, such as sectoral and country portfolios, to minimize this problem. According to Ariff et al. (2013), "the expected changes in future earnings are normally specified in ERC studies using cross-sectional models, although with advances in methodology a panel or pooled time series regression is more suitable" for this topic. Hence, it is advisable to use panel regression to deal with both the time dimension and cross-section of firms. Panel regression may also be used to investigate the factors that affect the ERC. It may also be applied when using time series only.

Meanwhile, the event study method has been used to examine the impact of unexpected earnings announcement (event) on the stock price to find out whether there is a positive or negative abnormal return (AR) in response to good or bad news of such announcement. The immediate reflection of this announcement event in stock prices makes the

event study approach one of the important and useful methods in this regard.

Following the practice in majority of earnings-to-returns research on ERC's significance in the regression analysis, the variables used include, but not limited to, the following: abnormal returns (AR), cumulative abnormal returns (CAR), and earnings per share (EPS) as dependent variables; and firm size, actual revenues, earnings, leverage (debt-equity) ratio, and quality audit as independent variables. Some cash flow information has also been used as an independent variable to measure its impact on stock returns. We think all relevant information from the three primary financial statements (income statement, balance sheet, and statement of cash flow) could be used in ERC studies.

To form a representative sample, a randomly selected sample as a percentage of the companies listed on the stock exchanges has been used. Data on adjusted stock returns, i.e., adjusted for capitalization changes, also has been used. Market Index Return observations usually come from relevant indices that are composite indices. Company's interim to interim reports are desirable as known in the literature, hence quarter and semi-annual report dates are better sources for unexpected changes in earning. Using audited reports is known to provide no useful impact on share prices since such reports contain no or little surprises.

According to Ball & Brown (1968) as highlighted in Ariff, et al. (2013), unexpected earnings (UE) are calculated using the naive expectation model, which presumes that the best unbiased estimate of the next period's expectation is the current period's earnings. This is also in agreement with a research design to study concurrent impact of price change at a point in time. UE is calculated using this naive model as follows:

$$UEit = Eit - Ei(t-1) \quad (1)$$

Econometric refinements may be adopted to make sure that the parameters are robustly estimated. For example, to ensure that the data used satisfy the I (1) condition, the Johansen (1988) procedure may be used to test stationarity of the variables. Meanwhile, the multicollinearity (including comparing countries) may be examined and tested using the Variance Inflation Factor (VIF).

To calculate the unexpected stock returns and unexpected earnings changes, the model of Ball & Brown (1968) that is commonly known as unexpected earnings procedure has been used, taking the difference in accounting return between current and previous reporting period. Another common procedure, is via regressing log change stock prices against log change market index, has also been used. The residual ARs will be used as unexpected share returns. The above two procedures enable researchers to measure the unexpected earnings from accounting data over consecutive periods and measure the stock price responses to these announced earnings. In their study on Malaysia, Al-Baidhani et al. (2017) used both the event study method and regression method to examine the relationship between earnings announcements and stock returns in order to evaluate the ERC behaviour applying both individual stocks and portfolio approaches.

4. DISCUSSION

Pursuant to Ball & Brown (1968), the argument before that date was based on the notion that earnings amounts cannot be defined substantively as they lack meaning and hence their utility was assumed doubtful. In order to examine this assertion, they made the first attempt to document the empirical relationship between earnings announcements and stock price reactions at announcement times using data from US stock exchanges.

Considerable research followed. In their ERC study, Collins & Kothari (1989) found that ERC size differs cross-sectionally with the return intervals of the holding period. Later, a theoretical framework was developed by Cheng (1994) providing an illustration of a gradual process that reveals how the relationship between earnings announcements and stock returns can be formally modeled in accounting.

Sixteen years later, Kothari et al. (2010) contend strongly for a positive theory for the generally accepted accounting principles (GAAP) as providing a relevant theoretical framework. They stated that GAAP addresses the performance measurement and stewardship challenges that form the nature of two primary financial statements, the income statement and the balance sheet.

Although there are some opposing views, it is clear that a considerable amount of research on the subject of ERC is based on the view that accounting information is crucial to stock investors and consequently, to financial accounting standard setters. It is worth-mentioning that in addition to the income statement information that has been utilized in most studies to explain equity returns, there are other primary financial statements information that can be used for this purpose. For example, Huang & Zhang (2012) found that each of the balance sheet-based variables they utilized has a significant effect that is incremental to those of the earnings variables on stock return. They also found that using these variables improve the explanatory power from 11.5 per cent (using earnings-only-based model) to 13.9% (using combined earnings-balance sheet model) in cross-sectional samples of individual firms. Obviously this minor improvement may well be increased further simply by using panel regressions.

Patatoukas (2013) found that there is a correlation between new information about cash flows and discount rates, and earnings change at the stock market level. In addition, Mostafa & Dixon (2013) report that both earnings and cash flow from operations have incremental information content beyond each other.

Recently, Al-Baidhani, et al. (2017) found the following: First, the earnings change disclosures do positively affect the share prices if EPS increases, and negatively affect the share prices if the EPS decreases. This is supporting the results of previous studies in several markets. Second, the tests using all events at the level of individual firms show two results: a) the direction of the price changes are as per the accounting relevance theory and previous empirical evidence, and b) the ERC size is rather small during the studied period coinciding with the low economic growth period occurred in Malaysia due to the 2008 global financial crisis. Third, they also used the portfolio method of aggregating the events into portfolios in order to reduce

idiosyncratic noises, and consequently capture the permanent effect of the EPS change on a portfolio of firms. This study reveals an ERC value of 0.93 (i.e., the share price change is $0.93 for every dollar of EPS change announced at this portfolio level). Such an ERC size is considered very large compared to similar prior research results. This finding is also as per the general direction of the accounting relevance theory.

Therefore, we are of the view that the three primary financial statements, income statement, balance sheet, and statement of cash flow, all contain information that complement each other. Hence, it is highly recommended to use all relevant information from all of the three key financial statements to provide empirical evidence on the ERC behaviour in the long-run as well as identifying key determinants that may explain more fully the long-run stock price changes. In particular, using varying length of windows and aggregating earnings to longer windows are expected to help identify key factors that drive the ERC in this regard. Analytically, the results can be compared with book values to investigate relevant differences.

5. CONCLUSION, LIMITATIONS, AND IMPLICATIONS OF THE STUDY

5.1. Conclusion

The argument prior to 1968 was based on the limitations of the valuation method. Then, Ball & Brown (1968) applied the standard event study method from life sciences to measure the announcement effect of annual earnings as an important reporting event that may influence stock returns. However, more than two decades later, Ohlson (1990) criticizes the uncertainty, multiple dates, and inter-temporal consistency of the finance valuation theory models. In the same year, the positive accounting theory was again resurrected by Watts & Zimmerman (1990) who propose three ways to improve this theory literature. Similarly, Kothari et al. (2010) argue that this theory provides a theoretical framework that predicts how GAAP addresses the performance measurement and stewardship challenges.

The crux of Watts (1992) argument is that accounting choice theory provides hypotheses for association between ERC and gearing. Two years later, Cheng (1994) argues that an appropriate design can be successfully achieved only after fully understanding his theoretical model. Later, Roychowdhury & Watts (2007) used the accounting conservatism theory to examine the relationship between conservatism measures. Recently, Ball et al. (2013) help connect conservatism theory to the use of accounting information. They stated that financial reporting has been supported with new insight through the conditional conservatism concept.

To determine the relevance of earnings and book value on stock prices, Dimitropoulos & Asteriou (2010) found that book values are relevant only when they are combined with earnings in the OLS regression model. Meanwhile, Ohlson (2014) reveals that expected reported earnings for the next period are the same as stock price regardless of the transitory noise in reported earnings. Recently, Al-Baidhani et al. (2017) listed a number of research findings that are pursuant to the general direction of the accounting relevance theory as stated above. Their novel finding was that the share price response (or ERC) is very close to the size of earnings announced (that is, $0.93 share price change for every dollar of EPS change announced) when they used the portfolio method.

As detailed earlier, this review contributes to the essentials of the ERC literature. We recommend examining accounting information from all the three primary financial statements, and testing ERC in different individual and portfolio settings. This will, undoubtedly, enhance confidence in accounting information announcements by stock investors and firm's stakeholders at large, enabling them to make appropriate decisions as regards their respective stock.

5.2. Limitations of the Study

It is very unlikely that the research findings stated in this review as summarized and discussed may be generalized to all developed, emerging, and developing markets till further research of more markets are attempted. However, the present review may be used as tentative steps towards tackling the subject of earnings-to-returns relation, especially its ERC part, in the future.

Meanwhile, this review is meant to study a specific ERC topic; hence, it cannot be generalized to include other similar topics. There are other accounting sources of variations that may be used in this regard such as interest rate and debt-equity ratio which are recommended for future studies. Moreover, different periods, other than the periods covered in this review, are recommended for further studies, especially those periods where global financial crises occur. Future studies showing the differences before, during, and after these financial crises are recommended.

5.3. Implications of the Study

This review has a number of implications for investors, regulators, and the market. First, the strong impact of earnings announcement on share price changes should enable investors to have confidence in the financial reports. Second is the implication of making quality earnings information available to the financial statement users. The main goal of accounting is to provide the investors and the public with quality financial information about a business entity. Regulators and financial standards setters should keep on reviewing the relevant regulations to require the disclosure of financial statements that reveals reliable, relevant, and timely information. The strong support for the large impact of earnings changes on the ERC of portfolios indicates such information is critical for price formation.

The third implication, extending the knowledge to include more developed markets and more emerging markets that may add value in challenging the received knowledge as regards this stock price effect. Finally, one of the goals of governments worldwide is the disclosure requirement for corporate transparency. This review could be a great help to other researchers who are willing to emphasize the explanation of accounting practice across different markets, firms, and industries, other than the normal accounting role in providing valuation information in both developed and emerging markets.

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