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EARNINGS LESS RISK-FREE INTEREST CHARGE (ERIC) AND STOCK RETURNS: ERIC'S RELATIVE AND INCREMENTAL INFORMATION CONTENT IN A EUROPEAN SAMPLE

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Abstract

This study tests the information content of earnings less risk-free interest charge (ERIC) and analyses its ability to explain fluctuations in market-adjusted stock returns. Following Biddle et al. (1997) study design, we perform relative and incremental information content tests. Relative information content tests reveal that mandatory reporting metrics — such as earnings before extraordinary items (EBEI), cash flow from operations (CFO), and total comprehensive income (TCI) — are more highly associated with stock returns and firm values than ERIC or residual income (RI). A number of sensitivity analyses support our findings. To test incremental information content, we split ERIC into five components. Primary results indicated that components specific to ERIC — changes of net assets, after-tax interest expenses, and capital charge — do not add relative information content. Yet, sensitivity tests suggest that some ERIC components add incremental information, especially when accounting for market expectations. However, these findings are not economically substantial compared to CFO and EBEI. Overall, we conclude that mandatory metrics generally outperform ERIC and residual income. Our unique contribution lies in applying the established methodology of measuring economic value added (EVA's) relative and incremental information content to ERIC.

Keywords: Earnings Less Risk-Free Interest Charge, Relative Information Content, Incremental Information Content, Economic Value Added, Shareholder Value, Value-Based Management

Authors' individual contribution: Conceptualization — R.L.; Methodology — R.L.; Software — A.G.; Validation — A.G. and R.L.; Formal Analysis — A.G.; Investigation — A.G.; Resources — R.L.; Data Curation — A.G.; Writing — Original Draft — A.G.; Writing — Review & Editing — R.L.; Visualization — A.G. and R.L.; Supervision — R.L.; Project Administration — R.L.

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1. INTRODUCTION

Fashions in financial performance measurement have varied widely over the past decades. For instance, earnings as a key mandatory indicator of a firm's consolidated performance date back to the early twentieth century (Koller et al., 2015; Stewart, 1991). Since then, policymakers have developed various accounting standards requiring firms to highlight specified financial components

(e.g., cash flow from operations and total comprehensive income (TCI)) in their reporting (Nobes & Parker, 2008). In addition, economists and practitioners have always challenged policymakers and accounting standards by promoting residual income-based performance metrics which take market expectations into account (Rappaport & Mauboussin, 2001). Traditionally, managers and investors employ the weighted average required return of both equity and debt holders to assess the cost of investing (Ross et al., 2015), but its calculation faces challenges in practice. While available bond market yields or information provided by rating agencies can be reasonably used for the cost of debt calculation (Toft & Lueg, 2015b), no undisputed counterpart exists for equity. This leads managers and investors to make individual assumptions and to pick diverse financial metrics to assess the performance of their firms. From a theoretical viewpoint, it is accepted that a risk adjustment of basic financial key metrics improves the performance measurement of the entire firm (Biddle et al., 1997; Feltham et al., 2004; Koller et al., 2015; Toft & Lueg, 2015a).

However, empirical studies on the relationship between financial metrics and stock returns do not provide a definite answer as to which one metric is superior (Myers, 1996; Toft & Lueg, 2015a). Some authors support metrics based on residual income (RI) and prove their superiority to explain movements of stock returns (Feltham et al., 2004; O'Byrne, 1999). Others question the superiority of residual income-based measures over non-risk-adjusted, traditional accounting measures (Biddle et al., 1997; Tsuji, 2006). Thus, the empirical evidence continued to trigger debates regarding the superiority and explanatory power of performance metrics (Toft & Lueg, 2015a). In response, Velthuis (2004) developed a new metric in cooperation with KPMG, an audit firm, coined earnings less risk-free interest charge (ERIC) (Velthuis, 2004; Velthuis & Wesner, 2005). Unlike traditional residual income measures, ERIC accounts for a capital charge based on the marginal cost of debt. ERIC is a relatively new performance metric and so its ability to capture the value created for shareholders suffers from a relative lack of empirical support. Therefore, the aim of this study is to contribute to the current debate regarding financial performance measurement and examine ERIC's association with stock returns. Our study will support academics and practitioners in the choice of a financial metric to measure firm performance. In line with Biddle et al. (1997), we pose the research questions:

RQ1: Does ERIC have relative information content, that is, greater association with contemporaneous stock returns than residual income (RI) and traditional metrics, such as earnings before extraordinary items (EBEI), cash flow from operations (CFO), and total comprehensive income?

RQ2: Does ERIC have incremental information content, that is, do single components of ERIC help explain contemporaneous stock returns beyond what is explained by RI, EBEI, CFO, and TCI?

We explored these questions by replicating Biddle et al. (1997) methodology, as it is the most impactful and — with more than 1,200 citations on Google Scholar— the most cited study in this field. We use a sample of 2,167 firm-year observations over the period 2006–2013. We found that traditional metrics have the highest relative information content for explaining stock returns — CFO (R^2 = 5.4%), EBEI (R^2 = 5.2%), and TCI (R^2 = 2.7%) and that ERIC explains only 1.3% of the stock returns, and RI — 0.1%. These findings are robust across a number of additional analyses.

To answer the questions, ERIC was split into five components (cash flow from operations, operating accruals, other changes of net assets, after-tax interest expense, and capital charge). Each component was evaluated for its ability to explain market-adjusted stock returns. For the full sample, the relative information content tests failed to prove that components specific to ERIC added any additional information beyond that which was already provided by CFO, EBEI, and TCI. Further tests employing various specifications indicated that, while CFO and accruals are highly significant, components unique to ERIC are typically not significant. Overall, relative and incremental information content tests suggested that neither ERIC nor RI are superior to mandatory metrics in association with stock returns.

The paper is organized as follows. Section 2 introduces the theoretical background. Section 3 describes the methodology. Section 4 contains our findings. Section 5 presents sensitivity analyses and extensions. Section 6 discusses the results and Section 7 presents the conclusions of the study.

2. THEORETICAL BACKGROUND

2.1. Earnings less risk-free interest charge (ERIC)

ERIC is Velthuis' (2004) version of residual income (RI). ERIC methodology ensures that planning, performance analysis, management incentives, and decentralization are goal congruent concerning market value. For performance measurement, ERIC can be expressed as:

$$ERIC = EBIAT_{CS} - r_d * CI_{t-1} \quad (1)$$

where,

$EBIAT_{CS}$ = earnings before interest after taxes based on clean surplus condition;

r_d = weighted average after-tax cost of net financial obligations;

CI_{t-1} = invested capital at the beginning of the period.

Velthuis (2004) attempts to improve RI by calculating earnings before interest after taxes (EBIAT). The concept requires that all changes in net assets would be reflected in the firm's income ("clean surplus accounting"). This ensures that all accounting income and expenses, whatever their nature, are presented consistently, as they represent the actual income transferred between the firm and its shareholders. Under Generally Accepted Accounting Principles (GAAP) and international financial accounting standards, earnings presented in the income statement exclude such extraordinary items. Such extraordinary, "dirty surplus" items include unrealized gains or losses on securities available for sale, foreign currency translation gains and losses, and minimum required pension liability adjustments. Defining items as extraordinary allows managers to manipulate earnings (Bamber et al., 2010; Pfeiffer & Velthuis, 2009).

Furthermore, Velthuis (2004) argues that a capital charge based on risk-adjusted interest rates tends to overestimate the required return of investors, and consequently leads to lower profit values. The argument goes that, once the return has been achieved, the risk is in the past and therefore no longer has to be accounted for (Velthuis & Wesner, 2005). Consequently, he suggests calculating the capital charge based on the firms' cost of debt. The required return of debt is the weighted average of all components of net financial obligations and can be expressed as the risk-free rate plus the average premium that varies with a firm's probability of distress (Ross et al., 2015; Toft & Lueg, 2015b). The average minimum premium that is required to obtain capital from outside investors is determined by a firm's historical performance and competitive environment. Therefore, the capital charge determined by the cost of debt provides a reasonable benchmark that a firm has to exceed to create value for shareholders (Pfeiffer & Velthuis, 2009). An objective calculation of the after-tax cost of debt can be based on the yield to maturity of a firm's long-term, option-free bonds (Toft & Lueg, 2015b). However, Koller et al. (2015) argue that yield to maturity is only a promised rate, and so, it can only be applied as a suitable approximation of the cost of debt for firms that have a low probability of distress. Using the firm's bond ratings to determine the yield to maturity is a good alternative to calculating the yield to maturity directly (Toft & Lueg, 2015b).

2.2. Linkages between CFO, EBEI, RI, TCI, and ERIC

This section introduces and describes the relations between the earnings before extraordinary items (*EBEI*), cash flow from operations (*CFO*), total comprehensive income (*TCI*), residual income (*RI*), and earnings less risk-free interest charge (*ERIC*). In order to be consistent with Biddle et al.'s (1997) methodology the analysis starts by expressing EBEI as a sum of CFO and accruals:

$$EBEI = CFO + Accruals \quad (2)$$

where,
CFO = net cash generated from selling products;
$Accruals$ = measures of non-cash value flow related to operating activates, e.g., revenue accruals — e.g., sale on credit or deferred revenue; and finance accruals — change in pension expenses, wages payable, depreciation and amortization.

As mentioned above, extraordinary items are removed from the earnings attributable to a firm's shareholders to maximize the information value in earnings. Another performance metric analysed in this study is residual income which can be expressed as:

$$RI = NOPAT - WACC \times CI_{t-1} \quad (3)$$

where,
$NOPAT$ = net operating profit adjusted to taxes;
$NOPAT$ can be expressed as the sum of EBEI and after-tax interest expense (*ATInt*);
$WACC$ = weighted average cost of capital;
CI_{t-1} = invested capital.

Unlike EBEI, RI allows the evaluation of after-tax profitability without regard to how a firm is financed, but it deducts the required return of both firm's shareholders and debt holders. A positive RI indicates that the firm has created value beyond the expectation of equity and debtholders.

We also include TCI as a performance metric. Unlike operating income, *TCI* also considers all changes in net assets (except transactions with shareholders and the firm). These include other comprehensive income (such as unrealized gains/losses on securities available for sale, foreign currency translation adjustments, and gains/losses on derivative instruments), discontinued operations (such as the sale of a subsidiary), and extraordinary items such as transactions that are not common in the firm's business model (Larsen et al., 2014; Malmmose Peyton et al., 2014). Thereby, TCI is internally consistent ('clean' surplus) and less manipulable. We express TCI as:

$$TCI = EBEI + (EI\&DO + OCI) \quad (4)$$

where,
EI&DO = extraordinary items and discontinued operations;
OCI = other comprehensive income.

Relying on the above definitions, we divide ERIC into five components:

$$ERIC = CFO + Accruals + OthChg + ATInt - CapChrg \quad (5)$$

where,
$CapChrg = r_d CE_{t-1}$;
CE_{t-1} = capital employed at the beginning of the period;
OthChng = other changes of net assets. It is the sum of *EI&DO* and *OCI*.

Figure 1 illustrates the relationship between all metrics tested as independent variables in this study.

Figure 1. Components of ERIC

$ERIC = CFO + Accrual + OthChg + ATInt - CapChrg$

$Earnings\ Before\ Extraordinary\ Items\ (EBEI)$

$Total\ Comprehensive\ Income\ (TCI)$

$Earnings\ Before\ Interest\ After\ Taxes\ (EBIAT)$

$Earnings\ Less\ Risk\ -\ Free\ Interest\ Charge\ (ERIC$

2.3. Hypotheses development

Our study relies on the semi-efficient market assumption: this states that interactions between investors — some rational, some not — result in an observable market pattern of volatile prices that are generally in line with intrinsic stock values (Koller et al., 2015). Therefore, stock market returns incorporate the information conveyed by CFO, EBEI, TCI, RI, and ERIC. Following Biddle et al. (1997), value relevance is detected by performing relative and incremental information content tests. Relative

information tests help to rank performance metrics based on information content whereas incremental content tests help to assess how much value one metric adds beyond what is already provided by other metrics.

We use a two-tailed test of the null hypothesis — meaning that increasing accounting metrics can lead to either positive or negative stock returns — since the predictive validity for some of the metrics used is disputed (such as RI) or lacks sufficient empirical support (such as ERIC).

H_0 (null hypothesis): The information content of metric X_1 is equal to that of X_2.

X_1 and X_2 represent pairwise combinations from the set of metrics CFO, EBEI, TCI, RI, and ERIC. Rejection of H_0 is understood as evidence of a significant difference in relative information content. Alternative hypothesis (*H1*) is assessed by testing the null hypothesis that individual components of ERIC do not provide incremental information content beyond other components that also comprise CFO, EBEI, and TCI:

H1: Components of X_1 do not provide information content beyond the remaining components X_2 to X_5.

X_1 to X_5 are components of ERIC (i.e., CFO, *Accruals*, *OthChg*, *ATInt*, and *CapChrg*). The rejection of *H1* is understood as proof of incremental information content.

3. RESEARCH METHODOLOGY

3.1. Statistical models

We have chosen our methodology purposefully. Our main goal for our ERIC study was to achieve comparability to the previous EVA studies conducted (Toft & Lueg, 2015a). The seminal methodology on this topic — which most follow-up studies have replicated — is from Biddle et al. (1997). Thus, we also employ one-lag ordinary least-squares regression models for all hypotheses tests. Our unique contribution lies in applying this highly established methodology for EVA on a new key financial ratio, namely ERIC.

3.1.1. Models for relative information content

The one-lag regression model for relative information contest tests is expressed as follows:

$$D_t = b_0 + b_1 X_t/MVE_{t-1} + b_2 X_{t-1}/MVE_{t-1} + e_t \quad (6)$$

where,

D_t = dependent variable = market-adjusted stock returns for time *t*;

X_t = metric (CFO, EBEI, TCI, RI, and ERIC) scaled by MVE_{t-1} (market value of equity at the beginning of the fiscal year);

e_t = remaining random residuals of the regression model.

We perform ten pairwise combinations of regressions among CFO, EBEI, TCI, RI, and ERIC. Tests compare adjusted-R^2 by performing Vuong's (1989) likelihood-ratio test (LRT) which is designed to assess which of two competing non-nested models have greater explanatory power to justify variation in the dependent variable.

3.1.2. Models for incremental information content

Incremental content is assessed by analysing the statistical significance of regression slope coefficients:

$$D_t = b_0 + b_1 X_t/MVE_{t-1} + b_2 X_{t-1}/MVE_{t-1} + b_3 K_t/MVE_{t-1} + b_4 K_{t-1}/MVE_{t-1} + e_t \quad (7)$$

Incremental information content in equation (7) is observed using t-tests on individual coefficients b_1 to b_4 and F-tests of the joint null hypothesis by employing the Waldtest of coefficient restrictions (Wooldridge, 2017). To avoid the potential effects of heteroscedastic errors, White's (1980) test is employed.

3.2. Sample selection and scope

The firms investigated in this study belong to the S&P Europe 350 Equal Weight Index (EWI), which covers approximately 70% of the region's market capitalization. Data were primarily gathered from databases (Bloomberg, Compustat Global, Datastream), and hand-collected from annual reports where necessary. These data include up to nine annual observations for firms with fiscal years ending June 2005 to March 2014. The year 2005 was chosen as the starting point for gathering data because, since 2005, all listed firms in member states of the European Union have been required to use International Financial Reporting Standards (IFRSs). This allows for more comparability of test results.

The initial list of 349 firms, as of October 2014, was reduced and modified. First, 73 firms operating in the financial sector were deleted (Biddle et al., 1997): firms operating in the financial sector are highly leveraged, making their valuation much more dependent on the changing economic climate than firm valuations in other sectors (Lueg et al., 2019; Muheki et al., 2014; Schmaltz et al., 2019). Moreover, financial firms engage in various businesses which would require separate analysis and valuation of their key segments (Koller et al., 2015); however, separate accounts for different businesses are rarely available and, even if they were, the performance metrics and study design followed in this paper would not fit the complex business model of firms such as diversified banks or real estate investment trusts (Larsen et al., 2014). To increase the sample size, former constituents of the index during the sample period were also included, but to avoid any extraordinary fluctuations in market-adjusted stock returns, the data years for these firms were limited to the year they were removed from the index. Consequently, 73 firms were added back resulting in a total of 349 firms (3,311 firm-year observations). Then, 36 firms were removed due to unavailable database data or inability to provide lagged values. Finally, the sample was winsorized to 4 standard deviations, removing 33 extreme outliers. That is, data less (greater) than four standard deviations from the median of the firm-year observations were assigned a value equal to the median minus (plus) four standard deviations. The final sample consisted of 313 firms and 2,167 firm-year observations. Detailed information regarding sample collection can be found in Table 1.

Table 1. Sample selection procedure

Filter criteria	*Firms*	*Firm-year observ.*
Original firm list in S&P 350 Europe EWI*	349	
Firms operating in the financial sector	(73)	
Firms on COMPUSTAT Global file*	276	
Constituents added from previous years	73	
2013	9	
2012	5	
2011	12	
2010	5	
2009	6	
2008	15	
2007	6	
2006	15	
Firms on COMPUSTAT Global database with added firms	349	3311
Firms missing required Datastream data items		(485)
Firm-years for IC calculation only		(313)
Extreme outliers		(33)
Firm-years missing lagged values		(313)
Final sample	313	2167

*Note: * at October, 2014*

3.3. Dependent variable

The dependent variable is risk-adjusted stock returns (*MktAdjRets*). These are compounded 12-month stock returns less S&P Europe 350 equity index returns which show the outperformance of a firm relative to the development of the general market during this period. The 12-month not overlapping market-adjusted returns are postponed three months after a firm's fiscal year-end. This allows the information contained in a firm's annual report to take effect on stock market prices. Firms' stock returns as well as the returns on the S&P Europe 350 equity index were obtained from Datastream.

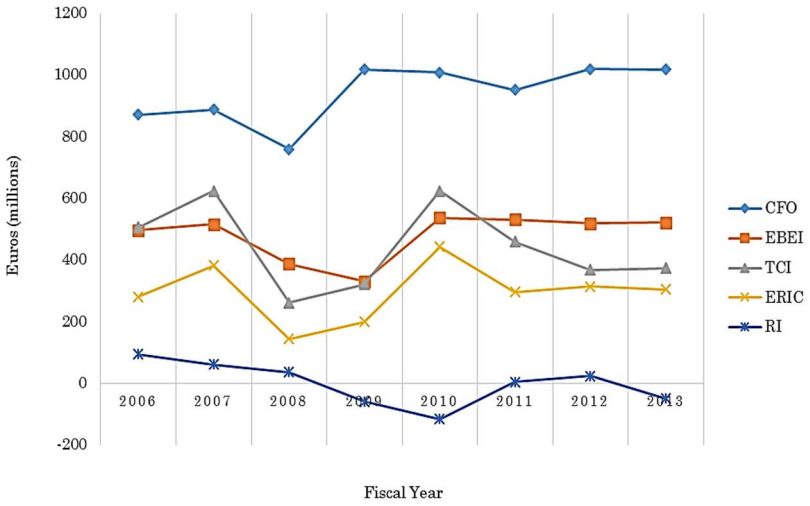
3.4. Independent variables and descriptive data

3.4.1. Relative information content tests

EBEI, CFO, and TCI were obtained from Compustat and residual income (RI) was calculated based on these. The *WACC* necessary for these calculations was sourced from Bloomberg. Section 3.4.2 provides definitions of after-tax interest expense (*ATInt*) and calculation of invested capital (IC_{t-1}). ERIC equals TCI plus after-tax interest expense less capital charge. Capital charge (*CapChrg*) is defined in Section 3.4.2.

To reduce the heteroscedasticity in the data, all independent variables were scaled by the market value of equity three months after the beginning of the fiscal years MVE_{t-1}. This was done to be consistent with the start of the stock returns period measured by the dependent variable. Consistent with Biddle et al. (1997) findings, descriptive statistics of observations revealed that EBEI had the lowest standard deviation of the five-performance metrics, and CFO had the highest firm-year mean and median followed by EBEI, TCI, ERIC, and RI. Undeflated median values of performance metrics are plotted across time in Figure 2. Figure 2 shows that RI reflects negative values in four out of eight years, whereas CFO, EBEI, TCI, and ERIC are positive every year. This concurs with Velthuis' (2004) statement that capital charge based on risk-adjusted interest rates tends to overestimate the required return of investors and therefore leads to lower profit values. Low RI might also be consistent with a potential upward bias in Bloomberg's weighted average cost of capital estimates.

Figure 2. Median values of performance measures



Correlations among performance metrics and market-adjusted stock returns are provided in Panel A of Table 2. Correlations between the independent variables were all positive and significant, except for RI and ERIC, which were negatively correlated with CFO The correlation between CFO and ERIC was insignificant. RI was negatively correlated with stock returns. CFO was the metric most correlated with the market-adjusted stock return, followed by EBEI, TCI, and ERIC.

Table 2. Descriptive statistics for pooled data

***Panel A: Descriptive statistics on the dependent and independent variables in* relative *information content tests*[a]**						
	Dependent variable	***Independent variables***				
	$MrktAdjRet_t$	$EBEI_t$	TCI_t	$ERIC_t$	RI_t	CFO_t
Descriptive statistics						
Mean	0.060	0.063	0.059	0.029	-0.026	0.146
Median	0.037	0.063	0.061	0.044	0.003	0.117
Std. Dev.	0.302	0.072	0.105	0.144	0.117	0.118
Correlations[b]						
$MrktAdjRet_t$	1.000					
$EBEI_t$	0.120	1.000				
TCI_t	0.081	0.741	1.000			
$ERIC_t$	0.045	0.604	0.808	1.000		
RI_t	-0.034	0.632	0.508	0.772	1.000	
CFO_t	0.219	0.159	0.064	-0.063	-0.265	1.000
Panel B: Descriptive statistics on dependent and independent variables in incremental information content tests[a]						
	Dependent variable	***Independent variables***				
	$MrktAdjRet_t$	CFO_t	$Accruals_t$	$OthChng_t$	$ATInt_t$	$CapChrg_t$
Descriptive statistics						
Mean	0.060	0.146	-0.083	-0.003	0.010	0.036
Median	0.037	0.117	-0.050	-0.002	0.008	0.026
Std. Dev.	0.302	0.118	0.127	0.061	0.049	0.038
Correlations[b]						
$MrktAdjRet_t$	1.000					
CFO_t	0.219	1.000				
$Accruals_t$	-0.123	-0.807	1.000			
$OthChng_t$	0.003	-0.057	0.053	1.000		
$ATInt_t$	0.039	0.237	-0.251	-0.039	1.000	
$CapChrg_t$	0.065	0.547	-0.592	-0.033	0.340	1.000

Note: [a] The sample consists of 2,167 firm-year observations. Observations are winsorized +/- 4 standard deviations from the median. All variables are deflated by the market value of equity three months after the beginning of the fiscal year.
[b] Pearson correlation coefficients: > 0.0204 are significant at < 0.10; > 0.0319 are significant at < 0.01; > 0.0407 are significant at < 0.001.

3.4.2. Incremental information content tests

The independent variables are the five components of ERIC as described in Figure 1. CFO was described above. Operating accruals (*Accruals*) for the period equal EBEI minus CFO. Accruals may be positive or negative. Negative values are more common due to expense accruals such as depreciation. Other changes of net assets (*OthChng*) equal TCI minus EBEI, and can be negative or positive. After-tax interest expense (*ATInt*) is computed as interest expense minus interest income and multiplied by 1 minus the firm's tax rate. Interest income and interest expense were acquired from Compustat Global. The tax rate was obtained from KPMG's official webpage. After-tax interest expense might be positive or negative. Positive values were more common due to interest expense being higher than interest income. Capital Charge (*CapChrg*) is defined as the firm's average cost of debt times invested capital at the beginning of the fiscal year. The cost of debt for a given year was obtained from Bloomberg Terminal. Shareholders' equity, short-term debt, long-term debt, and other long-term liabilities were obtained from Compustat Global. Comprehensive income (CI) does not include minority interests.

Descriptive data of deflated and winsorized components of ERIC are shown in Panel B of Table 2. Consistent with Biddle et al. (1997), CFO had by far the largest correlation with market-adjusted returns. Both the mean and median of *Accruals* and *OthChng* were negative. Furthermore, correlations between *ATInt, CapChrg,* and *CFO* were positive and significant, indicating that firms with higher *CFO* tend to have higher amounts of debt and interest expenses. *Accruals* and *CFO* were highly correlated, supporting the accrual smoothing effect of earnings relative to operating cash flow (Biddle et al., 1997).

4. EMPIRICAL RESULTS

4.1. Relative information content tests

The results of the relative information content tests are provided in Table 3. The tests were assessed by comparing adjusted R^2s from five separate regressions for each performance metric — CFO, EBEI, TCI, RI, and ERIC. The highest R^2 is shown on the left and the lowest is on the far right of the table. Table 3 also shows the p-values from two-tailed statistical tests of relative information content for each of the ten possible pairwise comparisons. The results in Table 3 are based on equation (6) and show that CFO had the largest R^2. RI had the smallest R^2. The p-values indicate that four of the ten pairwise differences in R^2s are significant at conventional levels. Vuong's (1989) test results show that CFO is not statistically different from EBEI, but outperforms TCI, ERIC, and RI in relative information content.

The underlying regression in Panel A of Table 3 constrains the coefficients to be equal across all observations, whereas Panel B divides performance metrics into positive and negative values. This allows for checking whether the market reacts differently to the performance metrics of loss firms (Biddle et al., 1997). The results in Panel B indicate that R^2 increased for EBEI, TCI, and ERIC when allowing for separate coefficients. However, the performance metrics ranking remained the same. Tests show that there were only slight differences in value relevance within the mandatory metrics although these gaps widened when comparing the relative information content of ERIC and CFO. ERIC and RI were not statistically different from each other. Overall, the relative information content tests showed no evidence of ERIC or RI

dominating CFO, EBEI, and TCI. Panel B of Table 3 documents that the explanatory power of CFO (R^2 = 0.054), EBEI (R^2 = 0.052), and TCI (R^2 = 0.027) are all statistically more informative to predict stock returns than ERIC (at p-value = 0.004, 0.001, and 0.000, respectively). The explanatory power of ERIC (R^2 = 0.013) to predict stock returns better than RI (R^2 = 0.001) is not significant (p-value = 0.150). Section 5 provides a sensitivity analysis for these results based on alternative specifications.

Table 3. Tests of the relative information content of ERIC, CFO, EBEI, TCI, and RI (H_0)

Panel A: Coefficients of positive and negative values of each performance metric constrained to be equal[a]										
Rank order of R^2	***Observations***	***Relative information content***								
		1)		***2)***		***3)***		***4)***		***5)***
All firms	2167	*CFO*	>	*EBEI*	>	*TCI*	>	*ERIC*	>	*RI*
Adj. R^2		0.055		0.024		0.012		0.006		0.001
p-value[b]			(0.088)		(0.150)		(0.170)		(0.520)	
				(0.007)		(0.072)		(0.180)		
					(0.003)		(0.032)			
						(0.001)				
Panel B: Coefficient of positive and negative values of each performance metric allowed to differ[c]										
Rank order of R^2	***Observations***	***Relative information content***								
		1)		***2)***		***3)***		***4)***		***5)***
All firms	2167	*CFO*	>	*EBEI*	>	*TCI*	>	*ERIC*	>	*RI*
Adj. R^2		0.054		0.052		0.027		0.013		0.001
p-value[b]			(0.640)		(0.067)		(0.000)		(0.150)	
				(0.089)		(0.001)		(0.000)		
					(0.004)		(0.000)			
						(0.001)				

Note: [a] Underlying regressions are from equation (6), where MVE_{t-1} — the market value of equity three-months after the beginning of the fiscal year. Performance metrics are listed based on adjusted R^2 from highest on the left to lowest on the right. Statistical tests of difference in explanatory power between metrics are presented in parentheses below adjusted R^2.

[b] Two-tailed p-values represent tests of the null hypothesis of no difference between pairwise comparisons of adjusted R^2s (Vuong, 1989). The first row represents p-values for comparisons between first and second, second and third, third and fourth as well as fourth and fifth-ranked metrics. The next row represents comparisons between first and third, second and fourth as well as third and fifth-ranked metrics. The third row represents comparisons between the first and fourth as well as second and fifth-ranked metrics, and the last row represents a comparison between first and fifth-ranked metrics.

[c] Underlying regressions are modified versions of equation (6) to allow different coefficients on positive and negative values of independent variables: $D_t = b_0 + b_1 X_{t,pos}/MVE_{t-1} + b_1 X_{t,neg}/MVE_{t-1} + b_2 X_{t-1,pos}/MVE_{t-1} + b_2 X_{t-1,neg}/MVE_{t-1} + e_t$, where Dt — market-adjusted stock returns; X — given performance metric (CFO, EBEI, TCI, ERIC, RI), MVE_{t-1} — the market value of equity three-months after the beginning of the fiscal year.

4.2. Incremental information content tests

Table 4 shows the results of ERIC components and their incremental information content from regression:

$$MrktAdjRtrn = b_0 + b_1 CFO_t + b_2 CFO_{t-1} + b_3 Accruals_t + b_4 Accruals_{t-1} + b_5 OthChng_t + b_6 OthCng_{t-1} + b_7 ATInt_t + b_8 ATInt_{t-1} + b_9 CapChrg + b_{10} CapChrg_{t-1} \quad (8)$$

Predicted signs are shown to the right of the variable labels. A positive association was expected between returns and *CFO*, *Accruals*, and *OCI*, while a negative association was expected between adjusted stock returns and the two components representing costs: *ATInt* and *CapChrg*. The signs for lagged values were predicted to be negative. Test results showed that eight out of 10 coefficients were in the predicted direction, but only *CFO* and *Accruals* were significant in the one-tailed t-test at 0.000 level. Consistent with Biddle et al. (1997) findings, the relative sizes of F-statistics indicated that *CFO* and *Accruals* added the most incremental contributions in explaining market-adjusted returns. Additional tests failed to provide evidence that components specific to ERIC (i.e., *OCI* with p-value = 0.449; *ATInt* with p-value = 0.603; and *CapChrg* with p-value = 0.123) added incremental information beyond CFO and EBEI.

Table 4. Tests of the incremental information content of ERIC components: CFO, operating accruals, other comprehensive income, after-tax interest, and capital charge ($H1$)[a]

ERIC components	***Predicted signs***	***All firms***	***t-stat***	***F-stat***	***p-value[b]***
C		0.004	0.28		
CFO_t	+	1.248	7.73	30.410	(0.000)
CFO_{t-1}	-	-0.678	-4.15		
$Accrual_t$	+	0.547	3.86	10.400	(0.000)
$Accrual_{t-1}$	-	-0.490	-3.18		
OCI_t	+	0.051	0.35	0.800	(0.449)
OCI_{t-1}	-	-0.132	-1.18		
$ATInt_t$	-	-0.413	-0.83	0.510	(0.603)
$ATInt_{t-1}$	+	0.486	0.99		
$CapChrg_t$	-	0.092	0.21	2.090	(0.123)
$CapChrg_{t-1}$	+	-0.645	-1.51		
Adj.R^2		0.075			

Note: Observations for all firms equaled 2167.

[a] Dependent variable — market-adjusted stock returns, and independent variables are components of ERIC (CFO, operating accruals, other changes of net assets, after-tax interest expense, and capital charge).

[b] p-values in parentheses represent non-directional F-tests of the null hypothesis of no incremental information content.

Overall, the combined results suggest that ERIC does not outperform mandatory metrics in relative information content: in our sample, CFO, EBEI, and TCI are better predictors of stock returns. Likewise, ERIC fails to add incremental information content: the specific components that set it apart from cash or earnings (i.e., *OCI*, *ATInt*, and *CapChrg*) do not improve predicting stock returns on any statistically significant level (all p-value > 0.100). To check the reliability of the results provided above, we performed several sensitivity tests (see Section 5).

5. SENSITIVITY ANALYSES AND EXTENSIONS

This section assesses the sensitivity of the basic results. Hypotheses H_0 and *H1* were re-tested by: 1) dividing observations into four non-overlapping two-year periods; 2) changing the stock returns from one year to two — contemporaneous and one year ahead returns; 3) taking stock returns three months before the end of the fiscal year as the dependent variable; 4) changing the return interval from one to four years; and, 5) dividing observations into nine industry sectors based on the S&P Global Industry Classification Standard (GICS). Finally, the market value of equity three months after the end of the fiscal year was used as the dependent variable.

5.1. Portioning the sample into sub-periods

The results discussed in Sections 4.1 and 4.2 are based on observations pooled together across the years 2006–2013. This section discusses the results of relative and incremental information content tests based on observations, grouped into four non-overlapping two-year periods. Due to survivorship bias, the number of observations differs slightly across the measurement periods: 546, 560, 544, and 517 observations for the periods 2006–2007, 2008–2009, 2010–2011, and 2012–2013, respectively.

The results in Table 5 show that mandatory metrics tend to dominate. Pairwise comparisons of the relative information content tests in 2006–2007 show that adjusted R^2 is the largest for EBEI. However, the differences between metrics are not statistically significant at conventional levels. Only RI and CFO are statistically different. In 2008–2009, CFO had the highest R^2 (20.2%) and outperformed each of the other metrics at the 0.01 level. The differences between RI, TCI, EBEI, and ERIC are not statistically significant. In 2010–2011, RI had the highest R^2 (9.4%), but the differences between RI, EBEI, and ERIC were statistically insignificant. In 2012–2013, the relative information content tests failed to find any difference between any possible pairwise comparison.

Table 5. Tests of the relative information content of ERIC, CFO, EBEI, TCI, and RI (H_0) by dividing observations into four non-overlapping two-year periods

Rank order of R^2	***Observations***	***Relative information content***								
		1)		***2)***		***3)***		***4)***		***5)***
2006–2007	546	*EBEI*	>	*RI*	>	*CFO*	>	*TCI*	>	*ERIC*
Adj. R^2		0.025		0.012		0.004		0.003		0.001
p-value[b]			(0.420)		(0.027)		(0.650)		(0.790)	
				(0.550)		(0.059)		(0.490)		
					(0.640)		(0.065)			
						(0.700)				
		1)		***2)***		***3)***		***4)***		***5)***
2008–2009	560	*CFO*	>	*RI*	>	*TCI*	>	*EBEI*	>	*ERIC*
Adj. R^2		0.202		0.043		0.017		0.012		0.003
p-value[b]			(0.000)		(0.940)		(0.940)		(0.940)	
				(0.000)		(0.920)		(0.880)		
					(0.000)		(0.880)			
						(0.000)				
		1)		***2)***		***3)***		***4)***		***5)***
2010–2011	544	*RI*	>	*EBEI*	>	*ERIC*	>	*TCI*	>	*CFO*
Adj. R^2		0.094		0.089		0.083		0.055		0.013
p-value[b]			(0.880)		(0.640)		(0.028)		(0.059)	
				(0.073)		(0.031)		(0.014)		
					(0.120)		(0.008)			
						(0.020)				
		1)		***2)***		***3)***		***4)***		***5)***
2012–2013	517	*CFO*	>	*EBEI*	>	*TCI*	>	*ERIC*	>	*RI*
Adj. R^2		0.031		0.019		0.017		0.013		0.004
p-value[b]			(0.530)		(0.620)		(0.160)		(0.270)	
				(0.680)		(0.960)		(0.110)		
					(0.430)		(0.470)			
						(0.023)				

Note: [a] Underlying regressions are from equation (6). Performance metrics are listed based on adjusted R^2 from highest on the left to lowest on the right. Statistical tests of difference in explanatory power between metrics are presented in parentheses below adjusted R^2. [b] Two-tailed p-values represent tests of the null hypothesis of no difference between pairwise comparisons of adjusted R^2s (Vuong, 1989). The first row represents p-values for comparisons between first and second, second and third, third and fourth as well as fourth and fifth-ranked metrics. The next row represents comparisons between first and third, second and fourth as well as third and fifth-ranked metrics. The third row represents comparisons between the first and fourth as well as second and fifth-ranked metrics, and the last row represents a comparison between first and fifth-ranked metrics.

In the incremental information content tests, *CFO* and *Accruals* were significant in the three most recent periods (2008–2009, 2010–2011, and 2012–2013). *ATInt* and *CapChrg* added incremental information. Results can be found in Table A.1 (see Appendix). Overall, the relative information test dividing the observations into four time periods failed to demonstrate the superiority of ERIC or RI. The incremental information content tests proved that ERIC adds some information beyond that which

is already provided by mandatory metrics, however, it is not economically significant.

5.2. Two-year returns as dependent variable

To test the possibility that it takes longer for market participants to include new information in stock prices, the market-adjusted stock returns interval was extended from one to two years — contemporaneous and one year ahead. The relative information content tests showed that CFO had the highest R^2 (5.2%) and significantly outperformed all other performance metrics on the 0.01 level. The incremental information content tests failed to reject that components specific to ERIC add additional information beyond CFO. The results of the relative and incremental content tests can be found in Tables 6 and 7.

Table 6. Relative information content for two-year returns

Rank order of R^2	*Observations*	*Relative information content*								
		1)		*2)*		*3)*		*4)*		*5)*
This year +1 year ahead	1847	*CFO*	>	*RI*	>	*EBEI*	>	*TCI*	>	*ERIC*
Adj. R^2		0.052		0.006		0.004		0.002		0.001
p-value[b]			(0.000)		(0.160)		(0.003)		(0.640)	
				(0.003)		(0.570)		(0.014)		
					(0.000)		(0.610)			
						(0.000)				

Note: [a] Underlying regressions are from equation (6). Performance metrics are listed based on adjusted R^2 from highest on the left to lowest on the right. Statistical tests of difference in explanatory power between metrics are presented in parentheses below adjusted R^2. [b] Two-tailed p-values represent tests of the null hypothesis of no difference between pairwise comparisons of adjusted R^2s (Vuong, 1989). The first row represents p-values for comparisons between the first and second, second and third, third and fourth as well as fourth and fifth-ranked metrics. The next row represents comparisons between first and third, second and fourth as well as third and fifth-ranked metrics. The third row represents comparisons between the first and fourth as well as second and fifth-ranked metrics, and the last row represents comparisons between the first and fifth-ranked metrics.

Table 7. Incremental information content for two-year returns

ERIC components	*Predicted signs*	*2006–2007*	*t-stat*	*F-stat*	*p-value[b]*
C		0.079	3.707		
CFO_t	+	1.409	6.271	30.410	(0.000)
CFO_{t-1}	-	-0.907	-4.166		
$Accrual_t$	+	0.349	1.617	10.400	(0.000)
$Accrual_{t-1}$	-	-0.400	-1.957		
$OthChhg_t$	+	-0.150	-0.787	0.800	(0.449)
$OthChhg_{t-1}$	-	-0.104	-0.642		
$ATInt_t$	-	-1.163	-1.163	0.510	(0.603)
$ATInt_{t-1}$	+	1.157	1.582		
$CapChrg_t$	-	0.351	0.565	2.090	(0.123)
$CapChrg_{t-1}$	+	-1.222	-1.968		
Adj.R^2		0.058			

Note: Observations in 2006–2007 equalled 1847.
[a] Dependent variable — market-adjusted stock returns, independent variables are components of ERIC (CFO, operating accruals, other changes of net assets, after-tax interest expense, and capital charge).
[b] p-values in parentheses represent non-directional F-tests of the null hypothesis of no incremental information content.

5.3. Market returns at the beginning of the fiscal year as dependent variable

Firms release several financial reports per year. Therefore, market participants may adjust expectations during the year about the annual report. To assess this possibility, market-adjusted returns three months before the fiscal year-end were chosen as the dependent variable. Table 8 presents the results of the relative information content tests. EBEI had the highest R^2 (4.6%), followed by RI, ERIC, and TCI. This time, all four metrics significantly outperformed CFO.

The incremental information content results are presented in Table 9. *CapChrg* was significant at the 0.01 level, whereas *OthChng* and *ATInt* did not add any incremental information.

Table 8. Relative information content of ERIC, CFO, EBEI, TCI, and RI (H_0) where the dependent variable is market-adjusted stock returns three-months before the fiscal year-end

Rank order of R^2	*Observations*	*Relative information content*								
		1)		*2)*		*3)*		*4)*		*5)*
$MrktAdjRet_t$	2167	*EBEI*	>	*RI*	>	*ERIC*	>	*TCI*	>	*CFO*
Adj. R^2		0.046		0.042		0.039		0.036		0.018
p-value[b]			(0.580)		(0.280)		(0.420)		(0.016)	
				(0.210)		(0.580)		(0.045)		
					(0.320)		(0.010)			
						(0.006)				

Note: [a] Underlying regressions are from equation (6). Performance metrics are listed based on adjusted R^2 from highest on the left to lowest on the right. Statistical tests of difference in explanatory power between metrics are presented in parentheses below adjusted R^2. [b] Two-tailed p-values represent tests of the null hypothesis of no difference between pairwise comparisons of adjusted R^2s (Vuong, 1989). The first row represents p-values for comparisons between the first and second, second and third, third and fourth as well as fourth and fifth-ranked metrics. The next row represents comparisons between the first and third, second and fourth as well as third and fifth-ranked metrics. The third row represents comparisons between the first and fourth as well as second and fifth ranked metrics, and the last row represents comparisons between first and fifth-ranked metrics.

Table 9. Tests of the incremental information content of ERIC components (*H1*)[a], where the dependent variable is market-adjusted stock returns three months before the fiscal year-end

ERIC components	*Predicted signs*	*All firms*	*t-stat*	*F-stat*	*p-value*[b]
C		0.036	2.66		
CFO_t	+	0.517	4.01	9.64	(0.000)
CFO_{t-1}	-	0.786	0.77		
$Accrual_t$	+	0.617	5.52	15.53	(0.000)
$Accrual_{t-1}$	-	-0.153	-1.19		
$OthChhg_t$	+	0.077	0.65	1.60	(0.201)
$OthChhg_{t-1}$	-	-0.156	-1.52		
$ATInt_t$	-	-0.189	-0.51	0.165	(0.848)
$ATInt_{t-1}$	+	0.219	0.57		
$CapChrg_t$	-	-1.584	-5.064	14.32	(0.000)
$CapChrg_{t-1}$	+	0.756	2.435		
Adj.R^2		0.75			

Note: Observations equalled 2167.
[a] Dependent variable — market-adjusted stock returns, independent variables are components of ERIC (CFO, operating accruals, other changes of net assets, after-tax interest expense, and capital charge).
[b] p-values in parentheses represent non-directional F-tests of the null hypothesis of no incremental information content.

5.4. Four-year returns as dependent variable

According to Biddle et al. (1997), longer interval data is less sensitive to the choice of expectations model. We extended the return interval from one-year to four-years to allow testing of the possibility that the low explanatory power of ERIC and RI was due to the weaker expectations model. The regression model used to assess information content for four-year sums was:

$$MrktAdjRtrn = b_0 + b_1 \sum X_t / MVE_{t-4} + b_2 \sum X_{t-4} / MVE_{t-4} + e_t \quad (9)$$

The independent variables reflect 'four-year' sums. The regression model consists of lagged and non-lagged observations. Non-lagged terms were summed over the most recent four-year period, 2010–2013, whereas lagged terms were summed over the 2006–2009 year period. Since all eight years were used to examine the relative and incremental information content for each performance metric, only one test period is presented in Table 10. Results were similar to those of Section 5.3: EBEI had the highest R^2 (32.9%) followed by TCI (30.9%), ERIC (28.8%), and RI (23.3%). All four metrics outperformed CFO (13.9%).

Table 10. Tests of relative information content (H_0) over a four-year period[a]

Rank order of R^2	*Observations*	*Relative information content*								
		1)		*2)*		*3)*		*4)*		*5)*
4 year sums'	221	*EBEI*	>	*TCI*	>	*ERIC*	>	*RI*	>	*CFO*
Adj. R^2		0.329		0.309		0.288		0.233		0.139
p-value[b]			(0.240)		(0.540)		(0.088)		(0.590)	
				(0.150)		(0.099)		(0.140)		
					(0.007)		(0.110)			
						(0.009)				

Note: [a] Underlying regressions are from equation (9).
[b] Two-tailed p-values represent tests of the null hypothesis of no difference between pairwise comparisons of adjusted R^2s (Vuong, 1989). The first row represents p-values for comparisons between first and second, second and third, third and fourth as well as fourth and fifth-ranked metrics. The next row represents comparisons between first and third, second and fourth as well as third and fifth-ranked metrics. The third row represents comparisons between the first and fourth as well as second and fifth-ranked metrics, and the last row represents comparisons between the first and fifth-ranked metrics.

Table 11. Tests of the incremental information content of ERIC elements (*H1*) over a four-year period[a]

ERIC components	*Predicted signs*	*4 year sums'*	*t-stat*	*F-stat*	*p-value*[b]
C		0.060	0.947		
CFO_t	+	1.163	8.11	35.20	(0.000)
CFO_{t-1}	-	-1.045	-5.984		
$Accrual_t$	+	0.929	6.038	27.59	(0.000)
$Accrual_{t-1}$	-	-0.689	-5.333		
$OthChhg_t$	+	0.240	1.158	1.32	(0.268)
$OthChhg_{t-1}$	-	-0.261	-1.103		
$ATInt_t$	-	-1.062	-2.897	4.26	(0.015)
$ATInt_{t-1}$	+	1.252	2.876		
$CapChrg_t$	-	-1.112	-2.15	3.17	(0.044)
$CapChrg_{t-1}$	+	0.956	2.497		
Adj.R^2		0.350			

Note: Observations over four years totalled 221.
[a] Dependent variable — market-adjusted stock returns, independent variables are components of ERIC (CFO, operating accruals, other changes of net assets, after-tax interest expense, and capital charge).
[b] Underlying regression as follows: $MrktAdjRtrn = b_0 + b_1 \sum X_t / MVE_{t-4} + b_2 \sum X_{t-4} / MVE_{t-4} b_1 + \cdots + b_9 \sum X_t / MVE_{t-4} + b_{10} \sum X_{t-4} / MVE_{t-4} + e_t$, where Σ represent four-year sums, 2010–2013 for non-lagged terms and 2006–2009 for lagged terms; X = given ERIC component (CFO, Accruals, OCI, ATInt; CapChrg); MVE_{t-1} = the market value of equity three months after the beginning of the fiscal year.

Table 11 above shows the incremental information content of ERIC components after expanding the return interval from one to four years. CFO and Accruals were again highly significant. In addition, components specific to ERIC in this case — *ATInt* and *CapChrg* — offered some incremental information, but their contributions were not sufficient for ERIC to provide greater information content than EBEI or TCI.

Table 12. Sector-based test of relative information content

Rank order of R^2	***Observations***	***Relative information content***								
		1)		***2)***		***3)***		***4)***		***5)***
Energy	119	*TCI*	>	*EBEI*	>	*CFO*	>	*ERIC*	>	*RI*
Adj. R^2		0.180		0.127		0.110		0.031		0.002
p-value[b]			(0.310)		(0.510)		(0.690)		(0.330)	
				(0.250)		(0.410)		(0.540)		
					(0.300)		(0.290)			
						(0.230)				
		1)		***2)***		***3)***		***4)***		***5)***
Industrials	550	*CFO*	>	*EBEI*	>	*TCI*	>	*RI*	>	*ERIC*
Adj. R^2		0.115		0.017		0.001		0.001		0.001
p-value[b]			(0.003)		(0.330)		(0.950)		(0.018)	
				(0.000)		(0.460)		(0.000)		
					(0.000)		(0.069)			
						(0.000)				
		1)		***2)***		***3)***		***4)***		***5)***
Cons. Staples	236	*EBEI*	>	*CFO*	>	*TCI*	>	*RI*	>	*ERIC*
Adj. R^2		0.063		0.016		0.003		0.001		0.001
p-value[b]			(0.180)		(0.850)		(0.460)		(0.910)	
				(0.210)		(0.720)		(0.130)		
					(0.035)		(0.700)			
						(0.100)				
		1)		***2)***		***3)***		***4)***		***5)***
Inform. Tech	99	*TCI*	>	*ERIC*	>	*EBEI*	>	*RI*	>	*CFO*
Adj. R^2		0.222		0.207		0.123		0.104		0.074
p-value[b]			(0.630)		(0.390)		(0.650)		(0.540)	
				(0.380)		(0.270)		(0.580)		
					(0.270)		(0.380)			
						(0.370)				
		1)		***2)***		***3)***		***4)***		***5)***
Utilities	173	*EBEI*	>	*ERIC*	>	*CFO*	>	*TCI*	>	*RI*
Adj. R^2		0.025		0.011		0.007		0.001		0.001
p-value[b]			(0.400)		(0.140)		(0.530)		(0.350)	
				(0.100)		(0.020)		(0.240)		
					(0.096)		(0.380)			
						(0.160)				
		1)		***2)***		***3)***		***4)***		***5)***
Materials	308	*CFO*	>	*TCI*	>	*ERIC*	>	*EBEI*	>	*RI*
Adj. R^2		0.130		0.046		0.025		0.010		0.001
p-value[b]			(0.064)		(0.062)		(0.160)		(0.250)	
				(0.034)		(0.029)		(0.670)		
					(0.026)		(0.610)			
						(0.033)				
		1)		***2)***		***3)***		***4)***		***5)***
Cons. Discret.	402	*CFO*	>	*EBEI*	>	*TCI*	>	*RI*	>	*ERIC*
Adj. R^2		0.083		0.025		0.021		0.012		0.007
p-value[b]			(0.170)		(0.640)		(0.160)		(0.130)	
				(0.060)		(0.690)		(0.670)		
					(0.110)		(0.470)			
						(0.069)				
		1)		***2)***		***3)***		***4)***		***5)***
Health Care	150	*RI*	>	*EBEI*	>	*ERIC*	>	*TCI*	>	*CFO*
Adj. R^2		0.073		0.072		0.018		0.014		0.001
p-value[b]			(0.990)		(0.230)		(0.860)		(0.760)	
				(0.370)		(0.150)		(0.890)		
					(0.310)		(0.075)			
						(0.190)				
		1)		***2)***		***3)***		***4)***		***5)***
Telecom. Services	130	*EBEI*	>	*RI*	>	*TCI*	>	*ERIC*	>	*CFO*
Adj. R^2		0.014		0.008		0.001		0.001		0.001
p-value[b]			(0.940)		(0.670)		(0.630)		(0.800)	
				(0.490)		(0.760)		(0.860)		
					(0.750)		(0.740)			
						(0.053)				

Note: [a] Underlying regressions are from Equation (6). Performance measures are listed based on adjusted R^2 from highest on the left to lowest on the right. Statistical tests of difference in explanatory power between measures are presented in parentheses below adjusted R^2.
[b] Two-tailed p-values represent tests of the null hypothesis of no difference between pairwise comparisons of adjusted R^2s (Vuong, 1989). The first row represents p-values for comparisons between the first and second, second and third, third and fourth as well as fourth and fifth-ranked metrics. The next row represents comparisons between the first and third, second and fourth as well as third and fifth-ranked metrics. The third row represents comparisons between the first and fourth as well as second and fifth-ranked metrics, and the last row represents comparisons between the first and fifth-ranked metrics.

5.5. Relevance of performance metrics in different sectors

The constituents of the S&P 350 Europe Index represent 10 different business sectors: energy, materials, industrials, consumer discretionary, consumer staples, health care, financials, information technology, telecommunication services, and utilities. Since financial firms were not included in this study, this test presents the relevance of performance metrics in the remaining nine sectors. In general, the relative information content tests indicated that the performance metrics analysed in this study are stronger in the energy, health care, and information technology sectors. Furthermore, the tests indicated that mandatory metrics tended to outperform ERIC and RI. Tests for incremental information content tests failed to reject *H1* hypothesis, i.e., elements specific to ERIC do not add information beyond other metrics. The results for both the relative and incremental content tests can be found in Table 12 above and Table A.2 (see Appendix).

5.6. Market value of the firm as dependent variable

In order to assess whether performance metrics are able to influence market expectations of a firm net worth, the market value of equity was used as the dependent variable. Following Biddle et al. (1997), the number of performance metrics was increased by adding EBIAT and NOPAT. The regression model used in this section can be expressed as:

$$MVE = b_0 + b_1 Z_{t,pos}/capital_{t-1} + b_2 Z_{t,neg}/capital_{t-1} + b_3 \ln(capital_{t-1}) + e_t \quad (10)$$

where,
MVE = market value of equity at the end of the fiscal year obtained from Datastream. The variable is delayed by three months in order to give time for the market to assimilate information contained in the annual report into the stock price. Item obtained from Datastream database;
Z_t = given performance metric (CFO, EBEI, TCI, ERIC, EBIAT, RI, and NOPAT);
$capital_{t-1}$ = firm's invested capital at the beginning of the period;
ln = natural logarithm.

Table 13 shows that all performance metrics are able to explain large amounts of firms' value rather than overall stock returns. Similar to the results discussed earlier, there is no evidence of ERIC outperforming mandatory metrics in explaining market expectations of a firm's value.

Table 13. Extension of Biddle et al (1997) tests of relative information content (H_0) for ERIC, CFO, EBEI, TCI, RI, EBIAT, and NOPAT, where the dependent variable is the market value of equity

Rank order of R^2	***Observ.***	***Relative information content***												
		1)		***2)***		***3)***		***4)***		***5)***		***6)***		***7)***
MVE	546	*EBEI*	>	*NOPAT*	>	*RI*	>	*CFO*	>	*TCI*	>	*ERIC*	>	*EBEIAT*
Adj. R^2		0.596		0.559		0.522		0.485		0.486		0.461		0.448
p-value[b]			(0.035)		(0.000)		(0.750)		(0.000)		(0.330)		(0.750)	
				(0.000)		(0.050)		(0.000)		(0.000)		(0.140)		
					(0.002)		(0.014)		(0.000)		(0.000)			
						(0.092)		(0.006)		(0.000)				
							(0.700)		(0.004)					
								(0.054)						

Note: [a] Underlying regressions are from equation(10): $MVE = b_0 + b_1 Z_{t,pos}/capital_{t-1} + b_2 Z_{t,neg}/capital_{t-1} + b_3 \ln(capital_{t-1}) + e_t$. where MVE = market value of equity three-month after the end of the fiscal year; Z = given performance metric (CFO, EBEI, TCI, ERIC, EBIAT, RI, NOPAT), where pos. and neg. refer to positive and negative value of performance metric, respectively; $capital_{t-1}$ = firm's invested capital at the beginning of the fiscal year. Performance metrics are listed based on adjusted R^2 from highest on the left to the lowest on the right. Statistical tests of difference in explanatory power between metrics are presented in parentheses below adjusted R^2.
[b] Two-tailed p-values represent tests of the null hypothesis of no difference between pairwise comparisons of adjusted R^2s (Vuong, 1989). The first row represents p-values for comparisons between first and second, second and third, third and fourth, fourth and fifth, fifth and sixth as well as sixth and seventh-ranked metrics. the next row represents comparisons between first and third, second and fourth, third and fifth, fourth and sixth, as well as fifth and seventh-ranked metrics. The third row represents comparisons between first and fourth, second and fifth, third and sixth as well as fifth and seventh-ranked metrics. The following row represents comparisons between first and fifth, second and sixth, as well as third and seventh-ranked metrics. The fifth row represents comparisons between first and sixth as well as second and seventh, and the last row represents the relation between first and seventh-ranked metrics.

6. DISCUSSION

Motivated by the debate regarding performance metrics and their value relevance, this study examined the relative and incremental information content of ERIC and compared it with RI and mandatory metrics (EBEI, TCI, and CFO). Overall, we do not find any evidence that ERIC's relative information content substantially outperformed traditional metrics in predicting stock returns. In no case, did ERIC and RI significantly outperform mandatory metrics. We find only tentative evidence that elements specific to ERIC add some incremental information content. However, by assuming that the WACC and the amount of invested capital are slow to change, the information content tests performed in Sections 5.3 and 5.4 show that the relative information content of ERIC is not statistically different from EBEI or TCI. In addition, the incremental information content tests discussed in Section 5.3 show that capital charge calculated using the marginal cost of debt is incrementally important. However, this evidence was not replicated by other sensitivity analyses.

7. CONCLUSION

Our study concludes that ERIC generally outperforms the well-known RI, but fails to dominate mandatory metrics in predicting

risk-adjusted market stock returns. Although there is some evidence that elements unique to ERIC add incremental information, it is not enough to prove relative superiority over other metrics. In addition, small or no statistical differences among CFO, EBEI, and TCI lead to the conclusion that market participants do not generally favor one mandatory metric, but rather base their investment decisions on the overall financial performances of firms.

As for the limitation of our study, then there are various possible explanations for why our models failed to detect stronger value-relevance of economic profit-based performance metrics: first, our study may be subject to measurement error, and sample selection bias (Feltham et al., 2004). Even though the European Union is seeking to unite its markets, European firms in different countries face different legal constraints and requirements. This might lead to dissimilarities in accounting as well as market data (Lueg et al., 2014). Furthermore, the WACC as well as the marginal cost of debt obtained from Bloomberg may be subject to estimation error. In addition, market participants may differ in their ways of calculating the WACC or cost of debt.

Second, returns for the S&P 350 Europe Index were originally calculated in euros; however, because, eight EU members kept their own currencies, index returns were adjusted where necessary. To reduce the complexity, future research should focus on a less generalized sample. For example, by constraining the analysis based on country, various obstacles related to different currencies and regulations may be avoided. In addition, constraining the sample based on the industry sector would lead to better comparability of the firms.

Third, our research design was based on realized rather than expected future values of each performance metric (O'Byrne, 1999). Despite Velthuis' (2004) argument that ERIC is a good estimate of expected shareholder value, realized ERIC may not outperform realized values of other performance metrics in estimating future returns to shareholders. Investors might have a functional fixation on cash or earnings when valuing firms, so the market price could be a reflection of the (possibly theoretically inferior) use of cash and earnings. If investors realized the theoretical superiority of residual income measures, they might use them to value firms, and thereby have ERIC or RI reflected in market prices (Toft & Lueg, 2015a). To assess ERIC as a proxy for upcoming equity cash flows, further studies could be conducted with a focus on future expectations and approximations rather than realized values.

Fourth, our study was based on yearly data of the S&P Europe 350 Index constituents. To become part of the index, firms have to fulfil various requirements. This may lead to the suggestion that market participants tend to trust and base their future expectations on financial information provided by constituents.

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APPENDIX

Table A.1. Tests of the incremental information content (*H1*) by dividing observations into four non-overlapping two-year periods

	Predicted signs	*2006–2007*	*t-stat*	*F-stat*	*p-value*[b]	*2008–2009*	*t-stat*	*F-stat*	*p-value*[b]	*2010–2011*	*t-stat*	*F-stat*	*p-value*[b]	*2012–2013*	*t-stat*	*F-stat*	*p-value*[b]
Observations		546				560				544				517			
C		0.035	1.072			0.053	1.82			0.020	0.807			-0.043	-1.499		
CFO_t	+	1.097	2.349	2.76	(0.064)	1.708	6.211	21.240	(0.000)	0.953	3.892	7.58	(0.001)	0.794	2.212	2.860	(0.058)
CFO_{t-1}	-	-0.433	-1.199			-1.617	-4.789			-0.181	-1.034			-0.306	-0.686		
$Accrual_t$	+	0.589	1.096	0.63	(0.529)	0.509	2.076	4.32	(0.013)	0.983	3.856	7.77	(0.001)	0.620	2.348	2.890	(0.056)
$Accrual_{t-1}$	-	-0.240	-0.781			-0.732	-2.169			-0.295	-1.619			-0.520	-1.327		
$OthChhg_t$	+	-0.327	-1.454	5.26	(0.005)	0.206	0.919	1.00	(0.369)	-0.153	-0.761	0.61	(0.546)	0.267	0.687	0.236	(0.790)
$OthChhg_{t-1}$	-	0.639	2.966			-0.237	-1.023			-0.133	-0.893			-0.074	-0.168		
$ATInt_t$	-	-0.600	-1.121	0.65	(0.521)	-0.501	-0.841	0.730	(0.484)	-0.479	-0.657	0.91	(0.404)	1.599	0.611	1.043	(0.353)
$ATInt_{t-1}$	+	0.510	0.946			0.124	0.153			0.681	1.074			-1.130	-0.440		
$CapChrg_t$	-	-1.582	-1.84	2.66	(0.071)	1.445	1.922	4.58	(0.011)	-2.722	-4.552	10.91	(0.000)	0.576	0.511	0.135	(0.874)
$CapChrg_{t-1}$	+	0.332	0.394			-3.035	-3.023			1.282	2.274			0.353	0.419		
Adj.R^2		0.035				0.234				0.131				0.050			

Note: [a] *Dependent variable — market-adjusted stick returns, independent variable are components of ERIC (CFO, operating accruals, other comprehensive income, after-tax interest and capital charge).*
[b] *p-values in parentheses represent non-directional F-tests of the null hypothesis of no incremental information content.*

Table A.2. Sector-based test of incremental information content

	Predicted signs	Energy	t-stat	F-stat	p-value[b]	Materials	t-stat	F-stat	p-value[b]	Industrials	t-stat	F-stat	p-value[b]	Cons. Discret.	t-stat	F-stat	p-value[b]	Cons. Staples	t-stat	F-stat	p-value[b]
Observ.		119				308				550				402				236			
C		-0.040	-0.554			-0.071	-1.669			-0.040	-1.483			0.051	1.829			-0.013	-0.425		
CFO_t	+	2.061	4.13	8.72	(0.000)	1.347	2.813	5.33	(0.005)	1.291	4.662	10.970	(0.000)	1.747	4.948	12.37	(0.000)	1.970	3.762	7.16	(0.000)
CFO_{t-1}	-	-1.259	-2.336			-0.134	-0.362			-0.143	+0.573			-1.166	-2.992			-1.301	-2.356		
$Accrual_t$	+	1.277	2.211	2.86	(0.062)	0.681	1.976	3.23	(0.041)	0.297	1.161	0.680	(0.509)	0.574	1.777	2.9	(0.056)	1.637	3.194	5.17	(0.006)
$Accrual_{t-1}$	-	-0.538	-1.076			-0.659	-2.105			-0.075	-0.257			-0.651	-2.092			-1.027	-2.057		
$OthChhg_t$	+	1.596	3.816	7.72	(0.000)	0.959	3.16	5.04	(0.007)	-0.400	-1.430	1.120	(0.328)	-0.361	-1.249	2.38	(0.094)	-0.103	-0.355	0.89	(0.409)
$OthChhg_{t-1}$	-	0.438	0.885			-0.127	-0.608			-0.111	-0.460			-0.404	-2.085			0.326	1.287		
$ATInt_t$	-	-0.834	-1.249	5.48	(0.005)	1.218	0.922	3.84	(0.023)	-0.958	-1.042	0.690	(0.502)	0.172	0.180	0.06	(0.947)	-3.590	-1.632	1.35	(0.262)
$ATInt_{t-1}$	+	-0.728	-0.915			-0.719	-0.552			0.082	0.111			-0.108	-0.108			2.148	1.118		
$CapChrg_t$	-	-1.218	-0.561	0.4	(0.669)	1.317	1.351	2.75	(0.065)	0.675	0.661	0.480	(0.616)	-2.140	-2.395	5.65	-0.003	1.108	1.106	0.85	(0.429)
$CapChrg_{t-1}$	+	2.397	0.895			-2.054	-2.208			-0.889	-0.984			0.455	0.479			-0.169	-0.18		
Adj.R^2		0.250				0.118				0.126				0.147				0.072			

	Predicted signs	Health Care	t-stat	F-stat	p-value[b]	Inform. Tech	t-stat	F-stat	p-value[b]	Telecom. Services	t-stat	F-stat	p-value[b]	Utilities	t-stat	F-stat	p-value[b]
Observ.		150				99				130				173			
C		0.028	0.632			-0.095	-0.804			-0.009	-0.120			-0.055	-0.912		
CFO_t	+	1.430	2.173	2.55	(0.082)	2.570	2.126	2.31	(0.1052)	0.626	1.080	0.74	(0.481)	0.417	0.920	1.670	(0.191)
CFO_{t-1}	-	-0.807	-1.041			-1.069	-0.852			0.054	0.082			0.780	1.597		
$Accrual_t$	+	2.267	2.386	2.91	(0.058)	0.797	1.321	1.74	(0.181)	0.831	2.264	2.62	(0.077)	0.574	1.506	1.760	(0.176)
$Accrual_{t-1}$	-	-1.047	-1.593			-0.699	-1.184			-0.104	-0.217			0.470	0.922		
$OthChhg_t$	+	0.609	1.055	0.56	(0.574)	0.784	0.803	0.35	(0.702)	-0.126	-0.439	0.41	(0.665)	-0.734	-1.170	0.730	(0.484)
$OthChhg_{t-1}$	-	-0.286	-0.457			0.089	0.053			-0.264	-0.711			0.050	0.102		
$ATInt_t$	-	-0.309	-0.101	0.16	(0.855)	9.606	1.306	1.17	(0.316)	0.053	0.017	0.45	(0.638)	-2.405	-1.252	1.160	(0.317)
$ATInt_{t-1}$	+	1.300	0.547			-0.085	-0.017			0.277	0.088			2.593	1.367		
$CapChrg_t$	-	0.555	0.429	0.1	(0.906)	-0.714	-0.196	0.02	(0.976)	2.524	2.168	3.48	(0.034)	0.574	0.670	0.940	(0.391)
$CapChrg_{t-1}$	+	-0.247	-0.112			0.274	0.082			-3.115	-2.552			-1.315	-1.338		
Adj.R^2		0.051				0.193				0.048				0.025			

Note: [a] Dependent variable – market-adjusted stock returns, independent variables are components of ERIC (CFO, operating accruals, other changes of net assets, after-tax interest expense and capital charge).
[b] p-values in parentheses represent non-directional F-tests of the null hypothesis of no incremental information content.