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Earnings relevance changes post the Egyptian revolution crisis

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Abstract

Purpose – This paper aims to investigate whether the value relevance of accounting information has been affected by the occurrence of the Egyptian revolution financial crisis. More specifically, this paper examines the value relevance changes of three key accounting constructs: operating cash flow, normal non-discretionary accruals and discretionary accruals before and after the Egyptian revolution crisis.

Design/methodology/approach – Ordinary Least Squares (OLS) regression is used to examine the changes in earnings value relevance across before and after the Egyptian revolution crisis. The performance matched Jones model (Kothari *et al.*, 2005) is used to estimate the discretionary accruals.

Findings – After the Egyptian revolution financial crisis, the discretionary accruals (DAC) information value has significantly improved. However, the non-discretionary earnings components (OCF and NDAC) have minimal changes. The evidence of further analysis indicates that managers are using the discretionary accruals to signal the future adding value investments that respond optimally to changes in discount rates.

Research limitations/implications – The paper extends the literature debate about earnings management over a financial crisis; the findings provide implications for regulatory bodies that could learn how the common incentives of firms to attract potential investors during a crisis could lead them to provide a high-quality financial reporting.

Originality/value – Using data from the Egyptian market, the paper fills a research gap by examining the value relevance of earnings and tests whether the revolution crisis has influenced earnings reporting and firms' values from a relatively developing country with special institutional and enforcement backgrounds.

Keywords Egypt, Crisis, Value relevance, Earnings components

Paper type Research paper

1. Introduction

The financial reporting information quality is a major concern for investors doing their capital decisions. Investor certainty in regards the financial reporting credibility is so critical that governments worldwide spared no effort to stabilize markets enhancing investor confidence (Arthur *et al.*, 2015). A financial crisis causes transient current earnings, falling market capitalization and uncertainty about future earnings (Bepari *et al.*, 2013). Firms, in a financial crisis, would have an earnings systematic deterioration and an enormous number of them would experience losses. The transitory and noisy earnings nature would stimulate investors to revise their expectations of future earnings as the future becomes uncertain. In Egypt, The Egyptian revolution financial crisis, which initiated in 2011, adversely impacted reported earnings and the Egyptian stock exchange (EGX) performance, shook investor confidence and caused many listed EGX firms failure. The previous related crisis periods literature showed an investor confidence crisis; investors freaked and keen to sell shares (Okonjo-Iweala *et al.*, 1999; and Statman, 1999).

In regards to the financial reporting quality in crisis periods, concerns could be raised towards the management use of the accounting system adjusting earnings strategically (Filip and Raffournier, 2012; Kousenidis *et al.*, 2013; Iatridis and Dimitras, 2013; and Persakis and Iatridis, 2015). However, from another dimension, managers might choose to implement



the financial reporting transparency strategy to help enhance investor confidence and recover liquidity (Arthur *et al.*, 2015).

Egypt is an emerging market case with diverse predictions about the accruals superiority as an accounting-based performance measure. In the Egyptian capital market, the financial analysis industry is still not long established; forecasted financial information is not commonly disclosed by listed firms (Ragab and Omran, 2006 and Ebaid, 2010). So hard copy/on-line financial statements could be the core information source for the potential Egyptian capital market investors. Accordingly, most Egyptian market stock transactions are based on accrual accounting information. Therefore, the significance of accruals-based measures for stock pricing appears to be very high in the Egyptian context (Ragab and Omran, 2006; Hassan *et al.*, 2009 and Ebaid, 2010).

Over the past several years, Egypt has been actively reviewing and improving its regulatory frameworks, in particular, disclosure and corporate governance [i.e. Capital Market Law (CML) Number 95 of 1992 and the Egyptian Corporate Governance Code (ECGC) in 2005; 2012]. These regulatory revolutions have led to consequent changes in the nature of the information that potential users would need, as they would be looking forward to get more accurate and adequate information to aid them making rational decisions. However, in the light of an Egyptian context characterized by an accounting system offers several discretionary ways in the choice of accounting methods, the quality of accounting information would be questionable (Kamel and Elbana, 2010 and Ebaid, 2012a).

Egypt's institutional structures could raise the doubt in regards the financial reports quality. Alike a developing economy country example, in Egypt, the established accounting standards application and convergence are enforced by infirm regulatory government system (Ebaid, 2010). A high conformity is between the Egyptian financial reporting system and Egyptian taxation system. The Egyptian financial system is still bank-oriented, where firm financing is mainly based on a small number of banks. These contextual characteristics of Egypt motivates, although mandating the high-quality Egyptian accounting standards (EASs) adoption, firm management to produce low-quality financial reports.

Previous research studies suggested that Egyptian listed companies may engage in manipulating earnings to keep previous year earnings performance, avoid reporting losses, ease the external financing and achieve high-share valuation (Ebaid, 2012a). Recording manipulative provisions; expenditures capitalizing not expensing; and inventory overestimation are the common techniques used in earnings manipulation (Kamel and Elbana, 2010). Relative and incremental value relevance tend to be statistically higher for the accrual-based performance measures than operating cash flows (Ebaid, 2012b).

In 2011, the EGX witnessed unique market crash (the Egyptian revolution crisis) with adverse shocks that triggered a sudden loss of investor confidence in the EGX market. In such crisis period, managers may be motivated to opportunistically manipulate earnings using discretionary accruals choices to cover poor firm performance. However, after many firms' collapse during the crisis, investors may have less confidence about these discretionary accounting choices. Investors' confidence loss in return would lead to a significant decline in the relative discretionary accruals value relevance.

Altogether, there are reasons to be skeptical about the reliability and value relevance of earnings components, specifically accruals as a firm performance measure in Egypt. So, in light of these institutional characteristics, exploring the value relevance of accounting earnings and its components would be so crucial, especially given the Egyptian market economic circumstances (revolution crisis). Using Egyptian-based data, this paper investigates the degree that the value relevance of corporate earnings and its related components have reformed afterwards the crisis. The consequences of the Egyptian

revolution financial crisis in the context of earnings relevance is still unexplored. Extending prior research and filling this literature gap, this paper is concerned about the informational value consequences after the Egyptian revolution crisis in regards to three earnings components: non-discretionary accruals (NDC), discretionary accruals (DAC) and operating cash flow (OCF). After observing the difficulties that listed EGX firms faced because of the crisis, investors might provide less confidence in regards managers' discretionary accounting choices credibility. The sample period comprises the 2007-2010 pre-crisis period and the 2012-2015 post-crisis period. The DAC are estimated through disaggregating ACCR (total accruals) into DAC and NDAC. The DAC are extracted through using the performance matched modified Jones model version (Kothari *et al.*, 2005). Known that OCF and NDAC are less subject to alternative accounting methods managerial discretion (Dechow *et al.*, 1998), the investor confidence loss that may occur because of the crisis may not result in a significant decline in the relative value relevance of OCF and NDAC.

Briefly, the empirical results reveal that information value of DAC increased considerably post the crisis period. However, the information values of OCF and NDAC remained somehow similar. This lack of change is because of the inability of management to affect these non-discretionary earnings components except managers revolutionize a firm's real activities. Consequently, investors rationally valued non-discretionary earnings components (i.e. OCF and NDAC) in a consistent manner in both during the pre- and post-crisis periods, while they might misprice the effects of discretionary items (i.e. DAC) afterwards the crisis period. Post-crisis DAC and OCF value relevance (response coefficients) results remain consistent for current low growth level firms. Finally, separating the low growth firms positive discretionary and, moreover, firms with lower growth rates and recognizing positive discretionary accruals experience more pronounced DAC value relevance improvements. These findings could not be regarded to the managerial empire-building overinvestment incentives. However, the management optimism regarding the forward investment opportunities motivates them to use the discretionary accruals to signal the good news. Future research should provide more evidence investigating the drivers of the discretionary accruals value relevance.

Previous Egyptian-based research examined the reported earnings components quality for ordinary economic circumstances periods (Ebaid, 2010, 2012a,b; Kamel and Elbana, 2010, 2012; Kamel, 2012). Extending prior literature, this paper examines the different earnings components value relevance consequences after the Egyptian revolution crisis. The Egyptian institutional-based and accounting-based structures would give incentives to be uncertain regards reliability of earnings components, specifically accruals as a firm performance measure and provide a setting in which the discretionary accrual-stock returns negative relation is more likely to occur. This would seem more probable in a revolutionary crisis period, as the whole economy is deteriorating and facing obstacles to get back to normal levels. However, discretionary accruals are found to be used non-opportunistically as signals for prospective investment opportunities. Overall, these findings imply that Egyptian listed companies' managers optimally alter their investment according to discount rate fluctuations and tend to use accounting distortions as signals for future prospective investment opportunities. This paper results aid improved understanding of the earnings quality consequences of an investor confidence change regarded to exogenous shocks, as during the Egyptian revolution financial crisis. Moreover, the findings are useful to help anticipate the potential managerial behavior during upcoming periodic economic downturns. The paper gives important implications for potential EGX market investors in particular and stakeholders in general in regards to the earnings components information processing efficiency. Also, for regulators, findings decay the presumption for accruals

restriction to mitigate investors' misperception. Moreover, this paper extends the literature on accounting earnings relevance in developing economies after crisis periods and points to the need for future research to examine the discretionary accruals value relevance possible determinants in different developing countries context.

The remainder of the paper is structured as follows. Section 2 presents a review of the related literature and accordingly shows the developed research hypotheses. The research methodology is discussed in Section 3. Section 4 shows the empirical results, and finally, Section 5 offers some conclusions.

2. Background and hypotheses development

According to the agency theory, shareholders (principals) would bear monitoring costs to mitigate the management (agent) opportunistic behavior. When the managers who initiate and implement important decisions are not the major residual claimants and, therefore, do not bear a major share of the wealth effects of their decisions, consequently, they would have an incentive to make decisions that expropriate shareholders' wealth (Jensen and Meckling, 1976; and Fama and Jensen, 1983). This agency conflict between managers and shareholders is derived from the manager's tendency to appropriate perquisites out of the company's resources for his own consumption (Jensen and Meckling, 1976). Control of agency problems is important; without effective control procedures, such decision managers are more likely to take actions that deviate from the shareholders' interests (wealth maximization). According to Jensen and Meckling (1976), shareholders could limit divergences from their interest by establishing appropriate incentives for the managers and by incurring monitoring costs designed to limit the management opportunistic activities.

The accrual-based accounting system provide managers with flexibility in communicating private information about the firm's future prospects (Watts and Zimmerman, 1986 and Healy and Palepu, 1993); however, it could also be opportunistically used by management to maximize their utility (e.g. to conceal economic losses). Accruals are the core of the accrual accounting system. However, accruals recognition relies on valuations, allocations and deferrals, which all require a higher degree of subjectivity (Dechow *et al.*, 2010). Based on this, discretionary abnormal accruals could be regarded as a proxy for earnings management (Jones, 1991 and Dechow and Dichev, 2002).

The financial statements ability to reflect or summarize information that affects stock prices could be referred to as value relevance (Kothari, 2001). Higher value relevance level would make the financial statements a more reliable source for investment decisions, as the financial statement items would be highly correlated with firm stock-share prices or returns (Lam *et al.*, 2013). The relating economic uncertainty of crisis periods could have important consequences on accounting information value relevance (Gurarda *et al.*, 2016). Prior research claims that corporate earnings performance would convey information aligned to the prevailing macroeconomic performance (Ball *et al.*, 2003; Johnson, 1999; and Bepari, *et al.*, 2013). Johnson (1999) showed that earnings would have higher persistence in higher growth and production rates times and vice versa. Through a financial crisis, the firms would adjust their commercial and operational strategies so as to control the crisis subsequences. Also, firms would use alternative accounting methods to impact the accounting system output in a specific way consistent with their profile and needs (Iatridis and Dimitras, 2013). Strobl (2013) and Kane *et al.* (2015) claimed that in flourishing economy periods, executive management would be motivated to inflate profits, but otherwise in economic recessionary periods, while firms' performance is weakening, managers would provide concealed deflated earnings for future needs savings.

The information value of DAC dissimilar to OCF and NDAC critically depends on the managerial discretionary accounting alternatives decisions and the related market's investors' interpretation. More precisely, managers use DAC to manage earnings opportunistically (Healy, 1985; Healy and Palepu, 1993 and Subramanyam, 1996) or to signal to the market the firm's future prospects (Linck *et al.*, 2013; and Doukakis and Papanastasopoulos, 2014). To the level that DAC is the output of financial reporting managerial opportunism, investors would rationally assign a negative DAC value; therefore, it is more likely to observe an insignificant or weak association between stock returns and DAC (Teoh *et al.*, 1998a, b; DuCharme *et al.*, 2004; Louis, 2004; and Choi *et al.*, 2011).

On the contrary, the stock exchange would assign a positive DAC value based on the degree that managers apply the accounting choices discretion as a firm's future prospects private information convey tool (Louis and Robinson, 2005; Linck *et al.*, 2013; Doukakis and Papanastasopoulos, 2014; Robin and Wu, 2015). Signaling theory is fundamentally concerned with reducing information asymmetry between two parties (Spence, 2002). According to signaling theory, companies would like to distinguish themselves to avoid the adverse selection problem and discretionary accruals could be used as a signal for improved performance potential. Signaling theory could describe the managers' disclosure behavior, as they have access to private information that is not provisional for the general public. Based on signaling theory, managers could choose to communicate the firm's private performance information through discretionary accruals non-opportunistic signals that could be interpreted correctly by stakeholders (Connelly *et al.*, 2011). Some previous research studies acknowledged a positive significant DAC coefficient once regression of stock returns is on reported earnings components (Guay *et al.*, 1996; Subramanyam, 1996). Such evidence could reflect the market's credible signal consideration of the related DAC information (Krishnan, 2003).

The reported earnings accruals relieve mismatching and timing issues inherent in OCF as a performance indicating factor (Subramanyam, 1996). As the measurement process of accruals needs future cash flows realization estimation (e.g. allowance for bad debts) and the accrued non-cash expenses recognition (amortization expenses), executive management could participate significant discretion over accrual reporting. In case, investors do not have the ability to detect such opportunistic behavior (Bernard and Thomas, 1989, 1990; Abarbanell and Bernard, 1992; Ball and Bartov, 1996; and Sloan, 1996), managers would take advantage of the accounting choices inherent subjectivity and flexibility to accomplish opportunistic earnings objectives (Holthausen and Verrecchia, 1990; Ahmed *et al.*, 1999; and Healy and Palepu, 1993). Prior research showed evidence indicating that managers manage reported earnings opportunistically, and in return, such behavior weakens the reported earnings quality Xie (2001) found that DAC are less persistent than OCF and NDAC. Richardson *et al.* (2005) evidenced lower (higher) persistence level for accruals with less (more) reliability issues. Francis *et al.* (2004, 2005) found that low earnings quality because of high DAC increases the information asymmetry and, thus, the cost of equity capital. Stated by other words, as for the period of a crisis, firms are exposed to massive financial pressure and complications, executives would have earnings management motivations to enhance the firm's performance and endure the economic decline.

From an alternative view, during the crisis times, investors largely expect lower earnings performance levels, so managers would be less motivated to manage earnings opportunistically, but otherwise, managers might prefer to provide more enhanced financial reporting quality (Filip and Raffournier, 2014). Bepari *et al.* (2013) argued that during crisis periods, the managerial compensation based on equity raising has a relatively weaker relation with earnings management, as managers would have less incentives to provide

misleading earnings. This view is in line with some previous literature papers (Teoh and Wong, 1993) that showed improved investor confidence and, thus, market performance in the light of reduced information asymmetry and more credible earnings reporting.

In the crisis periods, firms experience a severe stock performance decline which adversely affect the investors' confidence and perception in regards the reported earnings credibility (more specifically DAC). Rational investors are more likely to interpret the increased DAC levels; meanwhile, the crisis period is viewed as a managerial opportunistic behavior outcome. Positive (negative) DAC are less likely to be perceived by investors as accountable signals of progressing (deteriorating) firm performance (Choi *et al.*, 2011). Such possible investor reaction would discourage firm's executive management from using DAC as a signaling device, especially after the crisis period.

Researchers are interested in investigating the accounting information quality in regional financial crisis such as Persian Gulf crisis of 1990 (Han and Wang, 1998), Mexican currency crisis of 1994 (Davis-Friday and Gordon, 2005) and Asia crisis of 1997 (Jungeun *et al.*, 2012). Moreover, a number of studies investigated the value relevance of accounting measures during the global financial crisis (Cimini, 2015; Flores *et al.*, 2016 and Gurarda *et al.*, 2016).

The literature findings are mixed and having conflicts between detecting a significant negative crisis effect on accounting numbers quality (Habib *et al.*, 2013) and showing a significant decrease in earnings accruals-based management after the financial crisis (Jungeun *et al.*, 2012).

In regards to Egypt as an emerging economy example, the subsequent economic downturn of 2011 revolution financial crisis has heightened the need for research on potential changes in the value-relevance of accounting information. This paper examines whether the occurrence of the revolution crisis impacts the value relevance of three key accounting constructs: operating cash flow (OCF), normal non-discretionary accruals (NDAC) and discretionary accruals (DAC). Consistent with prior literature, the following hypotheses are formulated as follows:

- H1. The value relevance of OCF changed insignificantly post the crisis.
- H2. The value relevance of NDAC changed insignificantly post the crisis.
- H3. The value relevance of DAC changed significantly post the crisis.

3. Research methodology

3.1 Earnings components measurement

Literature has proposed a number of estimation models for extracting discretionary (abnormal) accruals including Jones (1991); the modified Jones (Dechow *et al.*, 1995), the modified Jones with CFO (Dechow and Dichev, 2002) and the modified Jones with ROA (performance matched, Kothari *et al.*, 2005).

Peek *et al.* (2013) analyzed the performance of the modified Jones model and the Dechow and Dichev model across strongly heterogeneous samples, such as different countries. Peek *et al.* (2013) concluded that the Dechow and Dichev (2002) model is significantly more accurate in predicting accruals in all sample countries. However, concerns have been raised related to the Dechow and Dichev (2002) accruals quality measure because of the strong negative correlation between current operating cash flows and accruals (Gaio and Raposo, 2011; and Allen *et al.*, 2013). Such concern raises some author's doubts in regards to the

model fitness to meet the research objectives investigating the value relevance of discretionary accruals along with operating cash flows and non-discretionary accruals.

Wan (2010) sought to assess the relative performance of extant discretionary accruals models using a sample of firms that issued earnings restatements from 1997-2002. The analysis further indicated that the performance matched Jones model (modified with ROA) is the most accurate model relatively. Moreover, Cheng *et al.* (2012) assessed the relative performance of three representative models: modified Jones model, modified Jones model with operating cash flows (Dechow and Dichev, 2002) and modified Jones model with return on assets (Kothari *et al.*, 2005) using mispricing tests (e.g. relating current accruals to future returns). Cheng *et al.* (2012) mentioned that researchers should use the modified Jones model with return on assets model to estimate discretionary accruals to detect earnings management. However, Kueng and Shih (2014) explored two issues pertaining to performance matching model. They claimed that using performance matching to test earnings management will increase the frequency of measurement errors, and using them as the dependent or an independent variable in regression analysis will bias the regression coefficient toward zero.

The models' F value along with adjusted R^2 are used to choose between modified Jones model (Dechow *et al.*, 1995) and performance matched Jones model (modified Jones with ROA) (Kothari *et al.*, 2005), as managers could manipulate reported revenues by either postponing or recognizing forward of credit sales. Dechow *et al.* (1995) proposed a modification to the Jones model (1991) by subtracting the change in receivables from sales revenue. Through adjusting for growth in credit sales, the modified Jones model developed by Dechow *et al.* (1995) attempts to reduce the seminal Jones (1991) Model type II error (Dechow *et al.*, 2010). However, Kothari *et al.* (2005) suggested matching with performance when estimating discretionary accruals. Kothari *et al.* (2005) proposed the performance-matched Jones model by means of the difference between the Jones model and the equivalent discretionary accruals for a performance-matched firm. Thus, they adjusted the Jones (1991) and Dechow *et al.* (1995) accrual models containing lagged ROA. Kothari *et al.* (2005) found that adding firm-specific Return on Assets (ROA) to modified Jones model significantly improves estimates of discretionary accruals. They argued that theoretically, the performance controlling motivation comes from Dechow *et al.* (1998) earnings, cash flows and accruals simple model. Dechow *et al.* (1998) arguments of accruals are relevant to firm's performance and the ROA-based matching empirical superiority over other variables documented in literature (Barber and Lyon, 1996). Kothari *et al.* (2005) model presented that working capital accruals grow in forecasted future earnings and sales growth. Therefore, "*if performance exhibits momentum or mean reversion (e.g. performance deviates from a random walk), then predicted accruals would be non-zero*" (Kothari *et al.*, 2005, p. 165).

The ordinary least squares regression tests revealed that performance matched Jones model (Kothari *et al.*, 2005) would provide more accurate estimations for the paper sample firms' reported discretionary accruals. The performance matched Jones model (Kothari *et al.*, 2005) subsumes the modified Jones model (Dechow *et al.*, 1995) in both adjusted R^2 , F value and model significance [(0.068, 0.017); (9.445, 4.405); (0.000, 0.004), respectively].

Accordingly, study decomposes using performance-matched Jones model (Kothari *et al.*, 2005) the total accruals (ACCR) into normal, ordinary accruals (NDAC) and abnormal, discretionary accruals (DAC). The discretionary accruals (DAC) measure is the residual of Equation (1), which is the difference between total accruals (TACC) deflated by beginning total assets (ATA) and normal accruals (NDAC) estimated by the fitted values of Equation (1). Higher (lower) discretionary accruals values reflect lower (higher) accruals quality.

Consequently, lower (higher) accruals quality implies a lower (higher) level of earnings quality.

Operating cash flows (OCF) are measured by the difference between net income before extraordinary items and total accruals estimated using the balance sheet approach as equal to the non-cash current assets year-to-year change minus current liabilities plus changes in short-term debt:

$$\begin{aligned} TACC_{i,t}/ATA_{i,t} = & \alpha + \beta_1 1/ATA_{i,t} + \beta_2 \Delta REV_{i,t} - \Delta REC_{i,t}/ATA_{i,t} \\ & + \beta_3 PPE_{i,t}/ATA_{i,t} + \beta_4 ROA_{i,t} + \hat{\epsilon}_{i,t} \end{aligned} \quad (1)$$

where for firm i and in year t , $TACC_{i,t}$: total current accruals for year t estimated using the balance sheet approach scaled by total assets:

$$TACC_{i,t} = \Delta CA_{i,t} - \Delta CL_{i,t} - \Delta Cash_{i,t} + \Delta STDEBT_{i,t}$$

where $\Delta CA_{i,t}$: it is one-year change in current assets; $\Delta CL_{i,t}$ is one-year change in current liabilities; $\Delta Cash_{i,t}$ is one-year change in cash; and $\Delta STDEBT_{i,t}$ is one-year change in short-term debt.

$ATA_{i,t}$: is the total assets; $\Delta REV_{i,t}$ is annual change in revenues, scaled by lagged total assets; $\Delta REC_{i,t}$ is account receivables, scaled by lagged total assets; $PPE_{i,t}$ is gross property, plant and equipment, scaled by lagged total assets; $ROA_{i,t}$ is lagged return on assets; and $\epsilon_{i,t}$ is the error term.

3.2 Regression model

According to Allison (1994), for panel data, efficient estimation method could be accomplished by an application of OLS regression method if events are assigned by a randomized experiment. Specifying fixed-effects model using OLS regression automatically control for all unobserved differences between sample firms, regardless of whether or not those differences are associated with the likelihood of event occurrence (Allison, 1994).

The null hypothesis of poolability (pooled OLS) assumes homogeneous slope coefficients. An F (Fisher's) test can be applied to test for the poolability across cross-sections in panel data models, whose null hypothesis H_0 is that the variance of the unobserved fixed effects is zero. H_0 should be kept to consider the OLS estimation as appropriate. Analysis showed an intercept F value with a significance more than 0.05 (0.089), which indicates the fitness of the OLS regression estimation.

To test the research hypotheses on the possible effects of crisis on the earnings components information value, the following OLS regression is estimated:

$$\begin{aligned} RET_{i,t} = & \alpha + \beta_1 Po - CRISIS_{i,t} + \beta_2 NDAC_{i,t} + \beta_3 NDAC_{i,t} \times Po - CRISIS_{i,t} + \beta_4 DAC_{i,t} \\ & + \beta_5 DAC_{i,t} \times Po - CRISIS_{i,t} + \beta_6 OCF_{i,t} + \beta_7 OCF_{i,t} \times Po - CRISIS_{i,t} \\ & + \beta_8 Log - CAP_{i,t} + \beta_9 BM_{i,t} + \text{year fixed effect} + \text{industry fixed effect} + \epsilon_{i,t} \end{aligned} \quad (2)$$

where for firm i and in year t , RET is the annual stock return for the 12-month period ending at the fiscal year end; $Post-CRISIS$ denotes an indicator variable that equals 1 for post-crisis period (2012-2015) observations and 0 for the pre-crisis period (2007-2010) observations and discretionary accruals, non-discretionary accruals and operating cash flows are represented by DAC , $NDAC$ and OCF , respectively.

Note here that DAC and NDAC are measured by the residual and fitted values, respectively, of Equation (1), while OCF is measured by operating cash flows deflated by the total assets (ATA). The logarithm of a firm's market capitalization (LOG-CAP and book value to market value ratio (BM)) are added as control variables (Fama and French, 2003). Research variables operational measurement provides a summary of the research variables operational measurement:

- *Operating cash flows OCF*: It is measured by the difference between net income before extraordinary items and total accruals estimated using the balance sheet approach as equal to the non-cash current assets year-to-year change minus current liabilities plus changes in short-term debt.
- *Non-discretionary accruals NDACC*: Normal estimated accruals by the fitted values of performance-matched Jones model (Kothari et al., 2005).
- *Discretionary accruals DACC*: The residuals of performance-matched Jones model (Kothari et al., 2005) fitted values, which is the difference between total accruals (TACC) deflated by beginning total assets (ATA) and normal estimated accruals.
- *Stock return RET*: The annual stock return for the 12-month period ending at the fiscal year end.
- *Post-CRISIS*: An indicator variable that equals 1 for post-crisis period (2012-2015) observations and 0 for the pre-crisis period (2007-2010) observations.
- *Log-Cap*: The logarithm of a firm's market capitalization.
- *BM*: It is book value to market value ratio.
- *GROWTH*: It is the per cent of sales growth.

3.3 Sample selection and data source

The empirical investigation tests use financial statement data from the Thomson Reuters annual database. The sample test periods involve the pre-crisis period (2007-2010) and post-crisis period (2012-2015). The sample comprises all listed Egyptian firms-years with available financial and market data. Banks and financial institutions are excluded from the sample as its operating, investing and financing activities may not be clearly demarcated. The negative net working accruals and missing research variables information are excluded. The remaining sample firms are a majority of manufacturing firms including chemicals, construction materials and general industries sectors. Other non-manufacturing sectors include software and computer services, mobile telecommunications and travel and leisure. Table I provides a descriptive summary of the research sample.

4. Empirical results

4.1 Descriptive analysis

Table II reports the research variables mean and standard deviation. Table II, Panel A shows descriptive statistics for the whole sample period, Panels B and C exhibit the pre-crisis and post-crisis periods descriptive analyses, respectively. In Panel A, the DAC mean values are almost zero; this could be regarded to DAC measurement as the residuals of the performance matched modified Jones model proposed by Kothari et al. (2005). Second, the mean values of OCF and NDAC are slightly negative. The standard deviations for the three OCF, NDAC and DAC are relatively small. Overall, all of DAC, NDAC and OCF descriptive analyses exhibit similar distributional property.

Panels B and C of Table II reveal the following results. First, for both the pre- and post-crisis periods, the mean of RET is positive, indicating that firms encountered a stock prices reform after the crisis shock. Second, the DAC mean values are zero for both of sub-periods; however, the mean in the post-crisis period is negative. Accordingly, over the crisis, the overall change in the earnings management magnitude is a discretionary accruals measure decline. These findings advocate that to a greater extent managers have implemented discretion over accruals recognition in advance of than afterwards the crisis period. Finally, the OCF means over the two sample sub-periods are similar, whereas for the post-crisis period, the means of NDAC become more negative, which is mostly for the reason that the total accruals (ACC) means for the post-crisis sample period are decreasing.

Table III presents the research variables Pearson correlations coefficients. As shown in Table III, the correlation between Po-CRISIS and NDAC is significantly negative, suggesting a substantial reduction in accruals recognition after the crisis. The correlation between NDAC and OCF is significantly positive. However, the correlation between DAC and OCF is significantly negative. These findings indicate that firms with higher cash flow level are less

Average listed EGX firms per sample year	296
Exclude: banks and financial service sector firms	(20 banks + 43 financial service companies)
Sample listed EGX firms	233
Exclude: Negative net working accruals and missing data	(63 sample firms)
Final sample listed EGX firms	170

Table I.
Sample descriptive
summary

	Mean	Median	SD
<i>Panel A: Full sample</i>			
OCF	0.0892	0.0700	0.19108
ACC	-0.0013	-0.0079	0.16897
LOG-CAP	8.7813	8.6561	0.689696
RETURN	0.3382	0.0100	5.95124
BM	0.7876	0.6500	0.69816
NDAC	-0.0013374	-0.0000662	0.03727130
DAC	0.0000000	-0.0044020	0.16480560
<i>Panel B: Pre-crisis</i>			
OCF	0.0992	0.0900	0.18142
ACC	0.0088	-0.0045	0.14210
LOG-CAP	8.770588	8.65687	0.698373
RETURN	0.1071	-0.0300	1.15664
BM	0.6217	0.5300	0.48206
NDAC	0.0014277	0.131908	0.03801555
DAC	0.0073344	-0.0114593	0.13889409
<i>Panel C: Pro-crisis</i>			
OCF	0.0787	0.0600	0.20035
ACC	-0.0119	-0.0089	0.19269
LOG-CAP	8.792492	8.6493	0.681115
RETURN	0.5796	0.0400	8.42556
BM	0.9609	0.8000	0.83431
NDAC	-0.0042262	-0.119444	0.03629532
DAC	-0.0076626	0.0047882	0.18795961

Table II.
Descriptive analysis
for research variables

Table IV has three Columns a, b and c that report the value relevance of the accounting constructs: NDAC, DAC and OCF on RET without considering the post-crisis period condition, considering post-crisis period dummy variable or post-crisis period dummy variable with NDAC, DAC and OCF value relevance effects, respectively.

As per reported in Columns (a) of Table IV, when the Po-CRISIS dummy is excluded from Equation (2), the NDAC, DAC and OCF coefficients are positive, but only DAC and OCF coefficients are significant, suggesting that discretionary accruals and operating cash flow are in general value relevant through the sample period. However, the OCF is more value relevant (p level at 5 per cent) than the discretionary accruals; this could be regarded to its more objective non-discretionary recognition nature. The positive coefficient of DAC is consistent with the signaling theory, as it indicates the understanding of investors of the discretionary accruals nature and the signaling use of discretionary accruals by management reflecting potential value-adding investments.

As shown in Columns (b) of Table IV, when the Po-CRISIS dummy is included, the following results are shown. The Po-CRISIS dummy variable coefficient is significant and negative, which reveals the sample listed firms stock returns significant decline after the commence of the crisis in 2011. The coefficients on DAC and OCF are significantly positive at the 10 per cent level, asserting the DAC and OCF important value relevance in the pre-crisis period. The NDAC non-significant positive coefficient indicates the ignorance by investors to consider the normal accruals as an important pricing factor.

Testing for the value relevance changes in NDAC, DAC and OCF conditioning for the Po-CRISIS period, the results in Column c in Table II are reported. The coefficients on $OCF \times Po-CRISIS$ and $DAC \times Po-CRISIS$ are significant except for the coefficient on $NDAC \times Po-CRISIS$ is insignificant. These results reveal the insignificant variation in the non-discretionary accruals component information value in the pre-crisis and the post-crisis periods. More specifically, the crisis has no significant impact on the value relevance of NDAC. This finding is in line with H_2 . The coefficient on $DAC \times Po-CRISIS$ is significantly positive. Post the crisis, the information value of DAC, which is captured by the coefficient on $DAC \times Po-CRISIS$, Column c, is about triple of that for the total sample, which is captured by the coefficient on DAC, Column a, indicating that the Egyptian revolution financial crisis has resulted in an increase in the discretionary accruals component information value. These findings reflect the non-opportunistic behavior of managers; they are performing their agency tasks for the sake of stakeholders' benefits without any manipulation incentives. Similar finding is reported for the OCF component of earnings. Accordingly, H_3 is rejected, while H_1 is accepted. Finally, an improvement in the specified model explanatory power is shown when the main and interaction effects of the CRISIS dummy are included. For example, the adjusted R^2 increases from 20.1 per cent in Column (a) to 21.1 per cent in Column (c) of Table IV.

4.3 Changes in OCF, DAC and NDAC value relevance: pre-versus post-crisis analyses

To present a comparative perspective of the information value changes in the OCF, NDAC and DAC earnings components because of the Egyptian revolution crisis, the following regression is estimated for the pre-crisis 2007-2010 and pro-crisis 2012-2015 periods separately.

$$RET_{i,t} = \alpha + \beta_1 NDAC_{i,t} + \beta_2 DAC_{i,t} + \beta_3 OCF_{i,t} + \beta_4 \text{Log} - CAP_{i,t} + \beta_5 BM_{i,t} \\ + \text{year fixed effect} + \text{industry fixed effect} + \varepsilon_{i,t} \quad (3)$$

Table V shows that DAC coefficient increases significantly in the post-crisis period. However, in the pre-crisis period, the DAC coefficient is insignificant. The coefficient on OCF rose significantly after the crisis period from 1.339 to 15.235. Both OCF coefficients of pre- and pro-crisis periods are significant at 5 per cent level. The coefficient on NDAC shows a similar trend over the two sample periods. A negative non-significant NDAC coefficient is shown in the pre- and pro- crisis periods. The results of period-by-period regressions corroborate the results reported in Table V and lend further support to H_2 and H_3 but reject H_1 .

4.4 Further analysis

Investigating the driver of the positive significant increase in the DAC information value after the crisis, the sample firms are classified based on growth into low growth and high growth firms. The potential for increased growth is measured by the sales growth (SG). Above (below) the mean value of SG is considered as a high (low) growth firm. Regression (Equation 3) is estimated for the pro-crisis period only, as the significant increase of DAC is evidenced meanwhile. Table VI provides the comparative analysis of the information value of OCF, NDAC and DAC in regards to low versus high growth firms. For low growth firms, only OCF and DAC coefficients are positive and significant. However, only NDACC coefficient is showing positive significant implications for the high growth counterparts. These findings provide an indication of the managerial use of discretionary accruals post the Egyptian revolution to signal the potential future value added investment opportunities.

Earnings components value relevance: Pre- versus post- crisis	β	t value
<i>Pre-crisis</i>		
(Constant)	3.621	5.102***
OCF	1.339	2.661**
NDACC	-2.539	-1.574
DACC	0.932	1.557
Log-CAP	-0.421	-5.213***
BM	0.061	0.563
R ²	0.076	
F value	8.719	
<i>Pro-crisis</i>		
(Constant)	-6.143	-1.303
OCF	16.209	2.667**
NDACC	-2.237	-0.162
DACC	15.235	2.455*
Log-CAP	0.042	0.079
BM	5.396	12.948***
R ²	0.282	
F value	8.719	

Table V.

Period-by period regression analyses

Notes: *significant at the 0.1 level (two-tailed); **Significant at the 0.05 level (two-tailed); ***significant at the 0.01 level (two-tailed)

For firms with current growth investment opportunities, the non-discretionary accruals is the only earnings component reflecting economic consequences in the stock market.

To provide more in-depth investigation analysis, the high growth firms are classified into two subsets based on the sign of the discretionary accruals recognized. Regression tests (Equation 4) are performed for the positive discretionary accruals group. The regression test is estimated as follows:

$$\begin{aligned} \text{RET}_{i,t} = & \alpha + \beta_1 \text{NDACC}_{i,t} + \beta_2 \text{DACC}_{i,t} + \beta_3 \text{OCF}_{i,t} + \beta_4 \text{GROWTH}_{i,t} + \beta_5 \text{GROWTH} \\ & \times \text{DACC}_{i,t} + \beta_6 \text{Log} - \text{CAP}_{i,t} + \beta_7 \text{BM}_{i,t} + \text{year fixed effect} \\ & + \text{industry fixed effect} + \varepsilon_{i,t} \end{aligned} \quad (4)$$

Table VII shows that both DAC and Growth \times DAC coefficients are significant. The coefficient on DAC is positive and the coefficient on Growth \times DAC is negative. Both coefficients are significant at 10 per cent level. These findings give an assertion that discretionary accruals are used non-opportunistically to signal the good news of the

	β	t value
<i>Low growth firms</i>		
(Constant)	-0.188	-0.105
OCF	35.229	1.778*
NDACC	26.548	1.106
DACC	34.195	1.713*
R^2	0.037	
F value	3.800	
<i>High growth firms</i>		
(Constant)	0.022	0.402
OCF	0.361	0.740
NDACC	1.709	2.077*
DACC	0.115	0.212
R^2	0.066	
F value	6.270	

Table VI.
Pro-crisis growth-
level-based
regression analyses

Note: *Significant at the 0.1 level (two-tailed)

<i>Positive discretionary accruals</i>		
(Constant)	-0.038	-0.107
OCF	-0.147	-0.051
NDACC	6.255	1.568
DACC	10.017	2.199*
Growth	0.145	0.382
Growth*DACC	-10.278	-2.470*
R^2	0.043	
F value	3.132	

Table VII.
Pro-crisis
discretionary
accruals sign-based
regression analyses

Note: *Significant at the 0.1 level (two-tailed)

potential value adding investments (DAC coefficient). Proceeding with the investment opportunities, the reflecting growth discretionary accruals would be negatively related with the stock returns, suggesting optimal investment by firm executives in response to discount rate reductions (Doukakis and Papanastasopoulos, 2014).

5. Robustness and sensitivity test

The paper empirical results have been tested for sensitivity stems from the use of performance matching Jones model to estimate the discretionary accruals (Kothari *et al.*, 2005). Alternatively, the discretionary accruals are estimated using the modified Jones model (Dechow *et al.*, 1995); and the model residuals are used in OLS regression tests which investigates the potential value relevance of earnings components: non-discretionary accruals, discretionary accruals and operating cash flows in before and after the Egyptian revolution crisis. The findings (Table VIII) show similar earnings components value relevance change trends as reported earlier in Table V. The DAC coefficient increases significantly in the post-crisis period from 0.834 (at 10 per cent *p* value) to 10.239 (at 5 per cent *p* value). The coefficient on OCF rose significantly after the crisis period from 0.980 (at 10 per cent *p* value) to 11.186 (at 1per cent *p* value). However, differently the NDACC shows a negative significant coefficient in the pre-crisis period. But similarly (as reported in Table V a negative non-significant NDACC coefficient is shown in the pro-crisis period. As per these findings, the evidenced earnings components value relevance changes after the Egyptian revolution crisis could be considered robust and not sensitive to the discretionary accruals estimation method.

6. Conclusion

The EGX witnessed unique market crash (the Egyptian revolution crisis) with adversarial shocks that prompted an investor confidence loss. In such crisis period, managers may be

Per-versus post- crisis earnings value relevance analysis: Robustness test	β	<i>t</i> value
<i>Pre-crisis</i>		
(Constant)	3.762	5.391***
OCF	0.980	2.543*
NDACC	-4.937	-3.485**
DACC	0.834	1.685*
Log-CAP	-0.428	-5.379***
BM	0.074	0.682
R^2	0.083	
<i>F</i> value	9.398	
<i>Pro-crisis</i>		
(Constant)	-6.061	-1.286
OCF	11.186	3.519***
NDACC	-6.175	-0.249
DACC	10.239	3.134**
Log-CAP	0.058	0.109
BM	5.389	12.928***
R^2	0.283	
<i>F</i> value	36.215	

Table VIII.
Robustness tests:
modified Jones model
(Dechow *et al.*, 1995)

Notes: *significant at the 0.1 level (two-tailed); **significant at the 0.05 level (two-tailed); ***Significant at the 0.01 level (two-tailed)

motivated to opportunistically manipulate earnings using discretionary accruals choices to cover poor firm performance. However, after many firms collapse throughout the crisis, investors would be less confident about these discretionary accounting choices. Investors' confidence loss in return would cause a significant deterioration in the relative discretionary accruals value relevance. This paper investigates whether and how the discretionary and non-discretionary earnings components information value changed after the crisis. To the best of the author's knowledge, no previous research has examined the information value of operating cash flow, non-discretionary accruals and discretionary accruals earnings components in regards to future returns, more particularly, after the Egyptian revolution crisis.

The regression analyses showed the following results; after the Egyptian revolution financial crisis, the discretionary earnings component (DAC) information value has significantly improved. On the contrary, the information values of non-discretionary accruals earnings components (OCF and NDAC) have insignificant changes. The evidence of further analysis indicates that managers are using the discretionary accruals to signal the future adding value investments and managers adjust their investment opportunities optimally responding to the changes in discount rate (e.g. when discount rates increase, firms make less profitable investments, which leads to lower accrual levels and vice versa).

The research findings underline the importance of accounting financial analysis for performance evaluation in developing economies. Accrual-based accounting seeks to provide potential users with information content with more relevance. However, future research is needed to investigate the value relevance of earnings and its components in different developing economies contexts.

The findings would help the potential stakeholders properly use the financial statements information to anticipate future firm's performance, assess the earnings associated risk and, eventually, evaluate the firm's intrinsic value in comparison with observed market prices. For regulators, giving the discretionary accruals-stock returns relation represents a rational risk premium, then this greatly weakens the presumption that there is a need to restrict accruals for the purpose of preventing investor misperceptions.

The empirical analysis suffers from a number of limitations. For both pre- and post-crisis period, the specified model has a relative weak stock returns cross-sectional variation explanatory power. Various robustness tests are conducted; however, the uncontrolled factors possible influence cannot be ruled out. Accordingly, the empirical results should be interpreted with caution. Moreover, the results could not be generalized as analysis is based on a special market incidence (e.g. the Egyptian revolution financial crisis).

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