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Value relevance of earnings and cash flows during the global financial crisis

Md Khokan Bepari

*School of Commerce and Law, Central Queensland University,
North Rockhampton, Australia*

Sheikh F. Rahman

*School of Commerce and Law, Central Queensland University,
Melbourne, Australia, and*

Abu Taher Mollik

*Faculty of Business and Government, University of Canberra,
Canberra, Australia*

Abstract

Purpose – The purpose of this paper is to investigate the incremental value relevance of cash flow from operations (CFO) given book value and earnings. It also examines the relative value relevance of earnings and CFO and changes therein between the 2008-2009 global financial crisis (GFC) and the pre-crisis period (PCP).

Design/methodology/approach – Least square regressions are estimated using modified Ohlson model to examine the research questions. Relative and incremental value relevance is examined by adjusted R^2 and Vuong Z statistics.

Findings – The findings suggest that CFO has value relevance incremental to book value and earnings. The findings also suggest that earnings has greater relative and incremental information content than CFO in the Australian market. The value relevance of earnings has increased and that of CFO has decreased during the GFC compared to the PCP.

Research limitations/implications – This study focuses on a single country. Future studies can conduct cross-country examination of the impact of the GFC on the value relevance of earnings and CFO.

Practical implications – This study contributes to the debate on the value relevance of CFO incremental to book value and earnings. It also extends the literature, showing that earnings has information content (value relevance) superior to CFO in the Australian market even during an economy-wide exogenous shock like the one of the 2008-2009 GFC.

Originality/value – This is the first known study examining the value relevance of fundamental accounting information such as earnings and CFO in the context of the 2008-2009 GFC. It extends prior research in East Asian countries in the context of 1997 Asian financial crisis and provides evidence on the impact of a world-wide exogenous shock on the value relevance of earnings and CFO from a relatively mature and developed country with different legal, institutional and enforcement backgrounds.

Keywords Earnings, Cash flow, Cash flows from operations, Australia, Share prices, Value relevance, Global financial crisis

Paper type Research paper

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1. Introduction

This study investigates the incremental value relevance of cash flow from operations (CFO) given book value and earnings. It also examines the relative value relevance of earnings and CFO and changes therein between the 2008-2009 global financial crisis (GFC) and the pre-crisis period (PCP). Despite the long established requirement for cash flow statements, debate continues as to the usefulness of the information contained in CFO (Akbar *et al.*, 2011; Barton *et al.*, 2010). There is also a debate among investors, regulators and analysts on the superiority of earnings versus CFO. Although some academics and practitioners advocate for CFO, most of the investors prefer the earnings number as is evidenced by Wall Street's continued fixation on the quarterly earnings announcement (Sloan, 1996).

Recent evidence on the issue has sparked the debate. Subramanyam and Venkatachalam (2007) find that accrual-based earnings dominates CFO in association with firms' intrinsic value[1]. On the contrary, Bartov *et al.* (2001) find a performance measure more relevant when it captures in a more direct and timely fashion information about firms' cash flows. They argue that the value relevance of earnings over CFO is not universal and it depends on the financial reporting regime and other institutional factors. Barton *et al.* (2010) find that no single performance measure dominates in its association with firms' market value across the world[2].

Studies in the normal economic condition suggest that the relative and incremental value relevance of earnings and CFO are conditional on different factors which may not generalise to an economy-wide exogenous shock like the GFC. The GFC represented an economic disturbance. Firms' going concern risks and uncertainty increased substantially during the GFC (Xu *et al.*, 2011). Prior studies have also shown that firms' earnings management increases during periods of economic disturbances (Chia *et al.*, 2007; Zalk, 2009) and earnings management reduces the value relevance of earnings (Whelan, 2004; Marquardt and Wiedman, 2004). Kumar and Krishnan (2008) find that the value relevance of CFO and earnings differs based on firms' investment opportunity sets suggesting that the value relevance of CFO and earnings could differ based on firm specific and economic circumstances. Although prior literature on the 1997 Asian financial crisis (AFC) suggests that the value relevance of both book value and earnings declines during the economy-wide exogenous shock (Graham *et al.*, 2000; Davis-Friday *et al.*, 2006), there is a lack of evidence on the relative and incremental value relevance of earnings and CFO in the context of an economy-wide exogenous shock like the GFC.

This study extends the literature in two important ways. First, this is the first known study examining the impact of the GFC on the relative and incremental value relevance of earnings and CFO. It extends prior research in the context of the AFC and provides evidence on the impact of a world-wide exogenous shock on the value relevance of earnings and CFO from a relatively mature and developed country with different legal, institutional and enforcement backgrounds. The dearth of existing research addressing this specific time period implies that this paper makes a discrete contribution to the extant literature. Second, while most of the early studies examining the relative and incremental value relevance of earnings and CFO have focused on the US and UK data, this study uses a useful alternative data source to the much studied US and UK data. The Australian stock market is different from the US market in terms of size, financial reporting requirements and other institutional features (Clinch and Wei, 2011).

The findings suggest that CFO has value relevance incremental to book value and earnings. The findings also suggest that earnings has greater relative and incremental

information content than CFO in the Australian market. The value relevance of earnings has increased and that of CFO has decreased during the GFC compared to the PCP. The results suggest the superiority of earnings to CFO in determining share prices during a period of economy-wide exogenous shock like the GFC. The paper progresses as follows.

Next section briefly discusses prior literature and develops research questions. Section 3 outlines the data and sample selection procedures and Section 4 discusses the research design. Results are discussed in Section 5. Section 6 concludes the paper.

2. Prior literature and research questions

The debate on the importance of CFO in firm valuation can be traced back to Lee (1974) who argued that the earnings is ineffective in firm valuation. Earnings is considered to be ill-defined and many sided. It suffers from flexible accounting techniques and manipulation. On the contrary, CFO is not subject to managerial manipulations, and CFO portrays the ability of the organisation to survive. Bowen *et al.* (1987) suggest that cash flow should be added as an explanatory variable in addition to earnings. Barth *et al.* (1999) also find that both earnings and CFO have incremental value relevance over book value. Similar evidence is found by Habib (2008) in the New Zealand context. Moreover, regulatory bodies in the USA, the UK, Australia, Canada and the International Accounting Standard Board also support the notion that CFO contains value relevant information in assessing share prices (Charitou *et al.*, 2000).

Contrasting results have also been reported. Charitou *et al.* (2001) fail to find any incremental value relevance of CFO in UK if different contextual factors are not taken into consideration. Martinez (2003) also fails to find any additional information content of CFO beyond that contained in earnings in the context of France. Similarly, Saeedi and Ebrahimi (2010) do not find statistically significant incremental value relevance of earnings or CFO in the Iranian context. Capturing the essence of the above discussions, the first research question is:

RQ1. Does CFO have value relevance incremental to book value and earnings?

In accounting literature, there is a debate on whether earnings or CFO contains superior value relevant information. The Financial Accounting Standards Board asserts that financial reporting should primarily focus on earnings rather than CFO because “earnings provides a better indication of an enterprise’s present and continuing ability to generate favourable CFO than the information limited to the financial aspects of cash receipts and payments” (FASB, 1978, p. ix). Lev (1989) suggests that earnings is the premier information item provided in the financial statements. Moreover, earnings is superior to CFO as a measure of firms’ performance because of its matching and timing attributes (Dechow, 1994).

However, one school of thought argues that CFO rather than earnings is the primary source of information used in determining share prices. For example, Lee (1974) contends that cash flow measurement is the most useful information to investors because it enables the company to survive, it is not biased by measurement discretions and errors; and it can be used to predict firms’ future dividends and to evaluate loan repayment capacity.

Recent evidence on the issue has sparked the debate (Subramanyam and Venkatachalam, 2007; Kumar and Krishnan, 2008; Barton *et al.*, 2010; Akbar *et al.*, 2011). Bartov *et al.* (2001) claim that when a performance measure captures information about a firm’s performance more directly and more timely, it becomes more value relevant.

Yoon and Miller (2003) document the superiority of earnings to CFO in the Korean context, whereas Kwon (2009) finds that CFO has greater value relevance than earnings in Korea. On the contrary, Subramanyam and Venkatachalam (2007) claim that earnings dominates over CFO in association with firms' intrinsic value. Barton *et al.* (2010) find that no single performance measure dominates in its association with firms' market value across the world.

Earnings contains timely information to reflect the underlying changes in firms' performances due to its matching attributes. On the contrary, due to the inherent limitations of CFO in terms of matching revenues with expenses and losses, CFO lacks timely information to reflect firms' underlying performances. Dechow (1994) suggests that the explanatory power of CFO may be limited because of the timing and the mismatching problems. Capturing the essence of prior empirical evidences and the conjecture of the regulatory bodies, it can be expected that earnings is superior to CFO in explaining the variations in share prices during the PCP.

Prior studies suggest that the value relevance of earnings and CFO is conditional on different firm specific factors and economic conditions. Different contextual factors examined in the literature include transitory earnings components (Charitou *et al.*, 2000), magnitude of accruals (Dechow, 1994; Charitou, 1997), firm size (Hodgson and Stevenson-Clarke, 2000b), growth options (Charitou *et al.*, 2001), country level institutional and legal backgrounds (Bartov *et al.*, 2001; Charitou *et al.*, 2010), leverage (Hodgson and Stevenson-Clarke, 2000a), earnings permanence (Charitou *et al.*, 2000; Habib, 2008), CFO permanence (Ali, 1994; Cheng and Yang, 2003) and firms' financial health (DeFond and Hung, 2003). The economic disturbance caused by the GFC may also be one such contextual factor rendering earnings less informative and less value relevant than CFO.

Bernard and Stober (1989) argue that the value relevance of CFO and earnings differs based on different circumstances such as economic conditions and quality of measurements. CFO provides information about firms' solvency and liquidity, and it is a traditional accounting measure used to evaluate firms' credit and bankruptcy risks (Previts *et al.*, 1994). For this reason, the value relevance of CFO may increase when a firm's financial health deteriorates. Moreover, as the financial health of a firm deteriorates, financial analysts place more weight on CFO than earnings (DeFond and Hung, 2003). Kumar and Krishnan (2008) claim that the relative value relevance of earnings and CFO differs based on firms' investment opportunity sets. All these evidences imply that the value relevance of CFO and earnings differs based on firm specific and economic circumstances.

The conclusion of Hodgson and Stevenson-Clarke (2000a) that investors perceive earnings as less informative when the probability of failure increases and when the likelihood of earnings manipulation increases to avoid covenant violations may also imply that CFO will assume higher importance than earnings for stock valuation during the GFC, because the GFC has caused an increase in the going concern qualifications and the risk of business failures (Xu *et al.*, 2011).

The economy-wide downturn during a GFC may imply that the reported earnings contains temporary elements in the form of assets write-downs and impairments rendering the reported earnings a noisy performance measure. Prior studies also suggest that during the economy-wide financial crisis, firms engage in aggressive earnings management because it is difficult to meet the target (Chia *et al.*, 2007; Zalk, 2009; Masruki and Azizan, 2010). Prior studies also suggest that the value relevance of earnings decreases when firms engage in earnings management (Whelan, 2004). Moreover, the

decrease in the value relevance is more pronounced for the discretionary portion of earnings (Marquardt and Wiedman, 2004) implying that the value relevance of the cash component of earnings is not affected by the earnings management.

During a GFC earnings may become a noisy measure of firm performance for several reasons. First, significant economic uncertainty may render the reported earnings number unreliable as a proxy for future Firstly abnormal earnings. Second, during a GFC a large number of transitory items may transform the earnings to a noisy measure of firms' performance. Third, because most of the firms experience a systematic downturn, managers may be motivated to manage earnings and to take income decreasing earnings management through "big-bath". For example, Spear and Taylor (2010) show that under-performing firms tend to take larger write-downs during a GFC than other firms. They conclude that the evidence may indicate the opportunistic "big bath" earnings management by those firms. Fourth, the number of firms reporting negative earnings usually increases during a GFC compared to the PCP. Due to these disturbing reasons, earnings may lose its information content during the GFC. On the contrary, as discussed earlier, CFO is not subject to managerial manipulations, it is not contaminated by discretionary accounting adjustments and write-offs and it helps in evaluating the survival capacity of the organisation.

The fact that firms engage in earnings management during a financial crisis, the fact that the value relevance of earnings declines when firms engage in earnings management, the fact that the relative and incremental value relevance of earnings and CFO are conditional on firm specific and economic circumstances and the fact that the value relevance of CFO increases and that of earnings decreases when earnings is transitory may suggest that the relative and incremental value relevance of earnings and CFO will be different during a GFC from that observed during the PCP. Specifically, it can be expected that the association and the explanatory power of CFO with share prices will increase and the association and explanatory power of earnings with share prices will decrease during a GFC. Moreover, capturing the essence of prior empirical evidences and the conjecture made above, it can be expected that CFO is superior to earnings in explaining the variations in share prices during a GFC. Accordingly, as the second and third research questions we examine following two questions:

RQ2. Does earnings or CFO have superior value relevance during the PCP and during the GFC?

RQ3. What was the impact of the GFC on the value relevance of earnings and CFO?

3. Data source and sample selection

Financial accounting data and market value data has been collected from *DataStream* data base. The sample period includes 2004 to 2009. Following steps have been applied in selecting the sample firms. The initial sample consists of 9,615 firm-year observations. Companies in the financial sectors are excluded (1,611 observations). Firms with negative book value, missing book value, market value and other required variables are excluded (2,356 observations). Firms having non-June balance sheet date are excluded (545 observations). Finally, firms are ranked according to their year-end market value of equity and the top and the bottom 2 percent of the observations are excluded to remove extreme observations (218 observations). The final sample consists of a total of 4,885 firm-year

observations comprising of 599, 694, 765, 911, 940 and 976 firm-year observations for the year 2004, 2005, 2006, 2007, 2008 and 2009, respectively. Earnings during the GFC

4. Empirical methods

4.1 Definition of the GFC and the PCP

Drawing an appropriate time line for the GFC and the PCP in the Australian context is troublesome given that the GFC of 2008-2009 started in the US market in the mid-2007. The Australian financial market reflected little impact of the US sub-prime mortgage crisis during 2007 (Xu *et al.*, 2010). Grosse (2010) suggests that the US financial crisis began to develop into a GFC from 2008, and the first major event indicating the spill over effect was the failure of country-wide financial systems in January 2008. In this study, the GFC and the PCP are defined in the Australian context based on the existing literature (Xu *et al.*, 2011; Sidhu and Tan, 2011; Spear and Taylor, 2010) and the movement in the Australian Securities Exchange (ASX) All Ordinaries Index. The ASX All Ordinaries Index was 3,546.10 during June 30, 2004, 4,346.70 during June 30, 2005 and 5,034 during June 2006. It soared up to 6,310.6 during June 2007 and up to 6,779 during October 2007. Thereafter, the index began to decline, dipping to 5,332.9 during June 2008 and further to 3,296.9 during February 2009. At the end of June 2009, the index was 3,947.8[3]. In Australia, the unemployment rate dramatically began to rise from October 2007. The Reserve Bank of Australia successively cut interest rates from 7.25 percent in September 2008, to 3 percent in 2009. Taking these issues into consideration, the years 2008 and 2009 are considered as the GFC period, whereas the years 2004 to 2007 are considered as the PCP.

4.2 Empirical models

To examine question 1, firms' market value per share is regressed against firms' book value, earnings and CFO per share (Model 1). If the coefficient of CFO in Model 1 is statistically significant, it implies that CFO has value relevance incremental to book value and earnings. Moreover, if Model 1 has explanatory power (adjusted R^2) higher than that of Model 2, it implies that the inclusion of CFO as an additional independent variable can explain cross-sectional variations in share prices additional to that explained by book value and earnings[4].

In order to examine the relative value relevance (relative superiority) of earnings and CFO (question 2), Model 3 replaces earnings with CFO as an independent variable. Model 2 measures how much of the cross-sectional variation in share prices is explained by book value and earnings, whereas, Model 3 measures how much of the cross-sectional variation in share prices is explained by book value and CFO. Because both of these models include book value, any difference in the explanatory power between Models 2 and 3 represents the difference in the relative explanatory power between earnings and CFO. Thus, question 2 is examined by comparing the explanatory power of Models 2 and 3 during the GFC and the PCP. To derive the relative value relevance of earnings and CFO, Black (2003), Banker *et al.* (2009) and Kwon (2009) have used similar models.

Model 4 is used to formally test the change in the coefficients of earnings and CFO between the GFC and the PCP (question 3). To examine the impact of the GFC on the value relevance of earnings and CFO, the coefficients of the interaction term $CP * E$ (β_6) and $CP * CFO$ (β_7) are examined. As a complementary method, the explanatory power of Models 2 and 3 are compared between the GFC and the PCP to examine question 3.

Moreover, the changes in the coefficients of earnings and CFO in Models 1-3 between the GFC and the PCP are also examined to test question 3.

As discussed in Section 2, prior studies suggest that the relative superiority of earnings versus CFO is dependent on different contextual factors. Without controlling for the effect of these contextual factors, results on the impact of the GFC on the value relevance of earnings and CFO may be biased. Model 2 is extended as Model 2a and Model 3 is extended as Model 3a and Model 4 is extended as Model 4a to examine the impact of the GFC on the value relevance of earnings and CFO after controlling for the effects of different contextual factors such as firm size, leverage, accruals level, earnings permanence, CFO permanence and growth options.

Model 1:

$$MV_{it} = \alpha_{it} + \beta_1 BV_{it} + \beta_2 E_{it} + \beta_3 CFO_{it} + \lambda_1 \dots \lambda_n + \varepsilon_{it}$$

Model 2:

$$MV_{it} = \alpha_{it} + \beta_1 BV_{it} + \beta_2 E_{it} + \lambda_1 \dots \lambda_n + \varepsilon_{it}$$

Model 3:

$$MV_{it} = \alpha_{it} + \beta_1 BV_{it} + \beta_3 CFO_{it} + \lambda_1 \dots \lambda_n + \varepsilon_{it}.$$

Model 2a:

$$MV_{it} = \alpha_{it} + \beta_1 BV_{it} + \beta_2 E_{it} + \beta_3 LEV^* E_{it} + \beta_4 SIZE^* E_{it} + \beta_5 ACC^* E_{it} + \beta_6 EP^* E_{it} \\ + \beta_7 CFOP^* E_{it} + \beta_8 GRO^* E_{it} + \lambda_1 \dots \lambda_n + \varepsilon_{it}.$$

Model 3a:

$$MV_{it} = \alpha_{it} + \beta_1 BV_{it} + \beta_2 CFO_{it} + \beta_3 LEV^* CFO_{it} + \beta_4 SIZE^* CFO_{it} + \beta_5 ACC^* CFO_{it} \\ + \beta_6 EP^* CFO_{it} + \beta_7 CFOP^* CFO_{it} + \beta_8 GRO^* CFO_{it} + \lambda_1 \dots \lambda_n + \varepsilon_{it}.$$

Model 4:

$$MV_{it} = \alpha_{it} + \beta_1 BV_{it} + \beta_2 E_{it} + \beta_3 CFO_{it} + \beta_4 CP + \beta_5 CP^* BV_{it} + \beta_6 CP^* E_{it} \\ + \beta_7 CP^* CFO_{it} + \lambda_1 \dots \lambda_n + \varepsilon_{it}.$$

Model 4a:

$$MV_{it} = \alpha_{it} + \beta_1 BV_{it} + \beta_2 E_{it} + \beta_3 CFO_{it} + \beta_4 CP + \beta_5 P^* BV_{it} + \beta_6 CP^* E_{it} \\ + \beta_7 CP^* CFO_{it} + \beta_8 LEV^* E_{it} + \beta_9 LEV^* CFO_{it} + \beta_{10} SIZE^* E_{it} \\ + \beta_{11} SIZE^* CFO_{it} + \beta_{12} ACC^* E_{it} + \beta_{13} ACC^* CFO_{it} + \beta_{14} EP^* E_{it} \\ + \beta_{15} EP^* CFO_{it} + \beta_{16} CFOP^* E_{it} + \beta_{17} CFOP^* CFO_{it} + \beta_{18} GRO^* E_{it} \\ + \beta_{19} GRO^* CFO_{it} + \lambda_1 \dots \lambda_n + \varepsilon_{it}.$$

where:

MV_{it} = market value of equity per share at end of the year (30 June).

BV_{it}	= book value per share at the end of year (30 June).	Earnings during the GFC
E_{it}	= net income per share for the year.	
CFO	= cash flow from operations per share.	
CP	= indicator variable taking the value of 1 for the year 2009 and 2008, and 0 for the year 2007, 2006, 2005 and 2004. An indicator variable for the GFC.	
LEV	= dummy variable taking the value of 1 if the firm has above median leverage, 0 otherwise. Leverage is measured as total liabilities divided by total assets.	233
SIZE	= dummy variable taking the value of 1 if the firm has above median firm size, 0 otherwise. Firm size is measured as firms' beginning of the year market value of equity.	
ACC	= dummy variable taking the value of 1 if the firm has above median accruals and 0 otherwise. Firms are partitioned into two groups each year based on the median of absolute value of accruals divided by the beginning of the year market value per share. Firms lying above the median of $ TAC/MV_{t-1} $ are placed in high accruals group and firms lying below the median of $ TAC/MV_{t-1} $ are placed in the low accruals group. Accrual is defined as net income minus CFO.	
EP	= dummy variable taking the value of 1 if the firm has permanent earnings and 0 if the firm has transitory earnings. Firms are partitioned into two groups based on their absolute value of the change in the net income divided by the absolute value of firms' market value for each year. Firms lying below the median of $ \Delta NI/MV_{t-1} $ are placed in the permanent earnings group and firms lying above the median of $ \Delta NI/MV_{t-1} $ are placed in the transitory earnings group.	
CFOP	= dummy variable taking the value of 1 if the firm has permanent CFO and 0 if the firm has transitory CFO. Firms are partitioned into two groups based on their absolute value of the change in the CFO divided by the absolute value of firms' market value for each year. Firms lying below the median of $ \Delta CFO/MV_{t-1} $ are placed in the permanent CFO group and firms lying above the median of $ \Delta CFO/MV_{t-1} $ are placed in the transitory CFO group.	
GRO	= dummy variable taking the value of 1 if the firm has above median growth, 0 if the firm has below median growth. Firms are separated based on the yearly median market to book value ratio. Firms having above median market to book value ratio are placed in the high growth option group and firms having below median market to book value ratio are placed in the low growth option group.	
α_{it}	= intercept.	
ϵ_{it}	= error term.	
$\lambda_1 \dots \lambda_n$	= indicator variables representing industry dummies.	

Although there is a lack of consensus as to the appropriate ways to deal with the heteroskedasticity arising out of the scale effect, a large number of the value relevance studies have used the number of shares outstanding as a deflator (Davis-Friday *et al.*, 2006). Barth and Clinch (2009) show that the results obtained using variables on a per share basis and using undeﬂated variables provide the most unbiased estimates. In this study, all variables are expressed on a per share basis.

5. Results

5.1 Descriptive statistics

Table I, Panel A shows the descriptive statistics of market value per share (MV), book value per share (BV), earnings per share (E), CFO per share (CFO), and different contextual factors used as control variables. MV, BV and CFO are positively skewed implying that their means are greater than their medians. Earnings per share is negatively skewed implying that the median of earnings is greater than the mean. Skewness and kurtosis statistics together suggest that the variables are not normally distributed even after they

Panel A: descriptive statistics: 2004-2009					
	<i>N</i>	<i>Mean</i>	<i>SD</i>	<i>Skewness</i>	<i>Kurtosis</i>
MV	4,885	1.514	4.826	13.571	262.538
BV	4,885	0.601	0.938	2.594	10.035
E	4,885	0.020	0.514	− 12.721	297.918
CFO	4,885	0.024	2.603	36.552	1,628.490
Leverage	4,885	0.402	0.250	30.910	1,388.781
Size (AUD, 000)	4,885	610,790	4,539,990	20.743	536.550
Accruals level	4,885	0.253	3.569	56.821	3,321.06
Earnings permanence	4,885	0.491	3.164	17.774	389.902
CFO permanence	4,885	0.227	1.412	30.860	1,161.745
Growth	4,885	3.684	27.30	21.702	1,127.137
Panel B: number of firms with negative earnings and CFO: 2004-2009					
	<i>Negative</i>	<i>Positive</i>	<i>Total</i>		
Net income (NI)	2,576 (52.73%)	2,309 (47.27%)	4,885		
Cash flows from operations (CFO)	2,563 (52.47%)	2,322 (47.53%)	4,885		
Panel C: correlation coefficients: 2004-2009					
	<i>MV</i>	<i>BV</i>	<i>E</i>	<i>CFO</i>	
MV	1	0.493 **	0.585 **	0.483 **	
BV	0.547 **	1	0.488 **	0.447 **	
E	0.598 **	0.455 **	1	0.658 **	
CFO	0.437 **	0.462 **	0.636 **	1	

Notes: Significant at: *10, **5 and ***1 percent levels; MV_{it} – market value of equity per share at end of the year (30 June); BV_{it} – book value per share at the end of year (30 June); E_{it} – net income per share for the year; CFO – cash flow from operations per share; leverage – leverage is measured as total liabilities divided by total assets; size – size is measured as firms’ beginning of the year market value of equity; accruals level – accruals is defined as the absolute value of net income minus CFO per share; earnings permanence – earnings permanence is measured as the absolute value of the change in the net income divided by the absolute value of firms’ market value for each year (on a per share basis); CFO permanence – CFO permanence is measured as the absolute value of the change in the CFO divided by the absolute value of firms’ market value for each year (on a per share basis); growth – growth option is measured as firms’ market to book value ratio

Table I.
Descriptive statistics

are expressed on a per share basis. To reduce the heteroskedasticity problem arising out of the non-normal distributions, regressions are estimated with White (1980) heteroskedasticity consistent standard errors and *t*-statistics.

Table I, Panel B shows the number of firms with net loss and negative CFO. About 52.73 percent of the firms have negative earnings, whereas 52.47 percent of the firms have negative CFO. This high percentage of firms with negative earnings and CFO is consistent with Habib (2010) and Balkrishna *et al.* (2007)[5].

Table I, Panel C shows the correlation coefficient among MV, BV, E and CFO. Pearson correlation coefficients are shown in the upper diagonal and Spearman rank correlation coefficients are shown in the lower diagonal. BV is positively correlated with MV. Correlation coefficients between E and MV, between CFO and MV and between CFO and E are also positive and significant. Of particular note is that the correlation coefficients are not of high magnitude between any two of the independent variables to cause concern about multicollinearity problems[6].

5.2 Value relevance of CFO incremental to book value and earnings: test of question 1

Question 1 examines if CFO has value relevance incremental to book value and earnings. Table II shows results of Model 1 for different sub-periods. For the combined sample (both positive and negative earnings firms), the coefficient of CFO is positive and significant for all sub-periods. The coefficient of CFO (β_3) equals 1.719 in Model 1 which implies that after controlling for the effect of book value and earnings, 1 percent increase in CFO contributes to 1.719 percent increase in the share price. The coefficient of CFO (β_3) is also positive and significant for the positive earnings sample and negative earnings sample (Panels B and C, Table II). Thus, CFO has value relevance incremental to book value and earnings.

Further evidence on the incremental value relevance of CFO is reported in Table III. The adjusted R^2 for Model 1 (including CFO along with BV and E) is higher than the adjusted R^2 for Model 2 (excluding CFO as an independent variable) in all cases (Table III, Panels A-C). For example, for the combined sample, 48.15 percent variation in share prices can be explained by book value and earnings together (adjusted R^2 of Model 2 = 48.15), whereas 54.11 percent variation in share prices can be explained by book value, earnings and CFO together (adjusted R^2 of Model 1 = 54.11). Similar results can be observed for the positive earnings sample and for the negative earnings sample. The increase in the explanatory power (adjusted R^2) in Model 1 over Model 2 and the significant coefficient of CFO (β_3) suggest that CFO contains value relevant information incremental to book value and earnings.

5.3 Relative value relevance of earnings and CFO: test of question 2

To test question 2, the relative value relevance of earnings (adjusted R^2 of Model 2) is compared with the relative value relevance of CFO (adjusted R^2 of Model 3). Results are reported in Table III, Panel A for the combined sample, Panel B for the positive earnings sample and Panel C for the negative earnings sample.

For the combined sample, book value and earnings together explain 48.15 percent variation in share prices (adjusted R^2 of Model 2 is 48.15 percent), whereas book value and CFO together explain 38.91 percent variations in share prices (adjusted R^2 of Model 3 is 38.91 percent). For the positive earnings sample, book value and earnings together explain 57.61 percent variation in share prices, whereas book value and CFO together

Table II.
Relative and incremental
value relevance of
earnings and CFO: the
GFC and the PCP
comparison

	Model 1			Model 2			Model 3					
	α	β_1	β_2	β_3	Adj. R^2 (%)	α	β_1	β_2	α	β_1	β_3	Adj. R^2 (%)
Pooled	1.175 *** (18.309)	1.096 *** (12.577)	3.839 *** (13.889)	1.719 *** (32.990)	54.11 *** (17.969)	Panel A: combined sample			1.159 *** (17.668)	0.855 *** (16.688)	3.394 *** (34.171)	38.91
2009-2008	0.904 *** (10.863)	0.884 *** (6.156)	4.575 *** (23.646)	1.395 *** (10.363)	59.07 *** (4.338)	0.996 *** (4.338)	0.792 *** (16.118)	6.780 *** (7.108)	0.902 *** (9.451)	0.719 *** (7.636)	2.813 *** (14.073)	37.24
2007-2006	0.445 *** (3.980)	1.274 *** (25.215)	3.500 *** (9.554)	2.169 *** (13.502)	56.44 *** (3.876)	0.406 *** (3.876)	1.472 *** (17.439)	6.487 *** (6.011)	0.339 *** (2.955)	1.178 *** (31.435)	3.957 *** (22.209)	40.64
2004-2007	0.501 *** (16.338)	1.142 *** (5.298)	3.319 *** (6.106)	2.532 *** (3.918)	52.38 *** (10.211)	0.620 *** (10.211)	1.005 *** (10.880)	5.816 *** (5.633)	0.763 *** (9.575)	1.046 *** (31.506)	3.816 *** (11.804)	38.87
Pooled	0.641 *** (4.770)	1.276 *** (26.217)	4.922 *** (8.533)	2.406 *** (17.062)	61.46 *** (1.392)	Panel B: positive earnings sample			0.894 *** (6.691)	1.289 *** (28.097)	4.539 *** (17.781)	44.44
2009-2008	-0.114 (-0.654)	0.851 *** (10.627)	5.321 *** (15.314)	2.184 *** (1.004)	69.94 *** (-2.300)	-0.150 *** (-2.300)	0.822 *** (14.224)	8.136 *** (4.446)	0.034 *** (0.171)	.897 *** (21.796)	3.826 *** (15.008)	42.60
2007-2006	0.172 *** (0.753)	1.251 *** (9.863)	5.152 *** (11.845)	2.761 *** (7.577)	58.77 *** (1.562)	0.264 *** (1.562)	1.435 *** (6.849)	7.425 *** (5.515)	0.491 *** (1.964)	1.422 *** (20.927)	6.620 *** (10.520)	46.34
2004-2007	0.716 *** (4.210)	1.169 *** (21.996)	4.491 *** (11.229)	3.231 *** (17.282)	57.98 *** (7.544)	1.106 *** (7.544)	1.419 *** (16.451)	7.241 *** (8.453)	1.302 *** (7.641)	1.364 *** (20.624)	4.485 *** (18.493)	45.76
Pooled	0.410 *** (17.088)	0.818 *** (4.052)	-0.644 *** (-12.087)	0.976 *** (6.308)	32.05 *** (7.279)	0.228 *** (7.279)	0.846 *** (4.701)	-0.550 *** (-4.262)	0.478 *** (19.896)	0.820 *** (4.447)	0.674 *** (6.095)	26.33
2009-2008	0.279 *** (8.253)	0.503 *** (2.364)	-0.733 *** (-7.894)	0.599 *** (4.691)	26.78 *** (8.263)	0.272 *** (8.263)	0.526 *** (2.466)	-0.742 *** (-8.046)	0.353 *** (10.556)	0.516 *** (2.492)	0.411 *** (4.671)	18.42
2007-2006	0.347 *** (8.298)	0.816 *** (14.330)	-0.201 *** (-2.242)	1.164 *** (2.326)	37.87 *** (8.655)	0.321 *** (8.655)	0.996 *** (14.794)	-0.415 *** (-8.449)	0.357 *** (8.563)	1.052 *** (15.218)	0.619 *** (6.236)	31.83
2004-2007	0.371 *** (11.979)	0.860 *** (19.773)	-0.238 *** (-3.948)	1.286 *** (4.062)	38.72 *** (11.500)	0.321 *** (11.500)	0.889 *** (21.77)	-0.368 *** (-9.442)	0.382 *** (12.332)	0.810 *** (22.131)	1.171 *** (3.692)	31.92

Notes: Significant at *10, **5 and ***1 percent levels; Model 1: $MV_{it} = \alpha_{it} + \beta_1 BV_{it} + \beta_2 CFO_{it} + \lambda_1 \cdot \lambda_0 + \varepsilon_{it}$; Model 2: $MV_{it} = \alpha_{it} + \beta_1 BV_{it} + \beta_2 E_{it} + \beta_3 CFO_{it} + \lambda_1 \cdot \lambda_0 + \varepsilon_{it}$; Model 3: $MV_{it} = \alpha_{it} + \beta_1 BV_{it} + \beta_2 E_{it} + \beta_3 CFO_{it} + \lambda_1 \cdot \lambda_0 + \varepsilon_{it}$; MV_{it} – market value of equity per share at end of the year (30 June); BV_{it} – book value per share at the end of year (30 June); E_{it} – net income per share for the year; CFO_{it} – cash flow from operations per share; α_{it} – intercept; ε_{it} – error term; $\lambda_1 \cdot \lambda_0$ are indicator variables representing industry dummies

Notes: Significant at: *10, **5 and ***1 percent levels; Model 1: $MV_{it} = \alpha_{it} + \beta_1 BV_{it} + \beta_2 E_{it} + \beta_3 CFO_{it} + \lambda_1 \dots \lambda_n + \varepsilon_{it}$; Model 2: $MV_{it} = \alpha_{it} + \beta_1 BV_{it} + \beta_2 E_{it} + \lambda_1 \dots \lambda_n + \varepsilon_{it}$; Model 3: $MV_{it} = \alpha_{it} + \beta_1 BV_{it} + \beta_2 E_{it} + \lambda_1 \dots \lambda_n + \varepsilon_{it}$; E_{it} – net income per share for the year; CFO – cash flow from operations per share; α_{it} – intercept; ε_{it} – error term; $\lambda_1 \dots \lambda_n$ are indicator variables representing industry dummies

Year	Total value relevance (Adjusted R^2) BV, E and CFO (Model 1) (%)	Total value relevance (Adjusted R^2) BV, E (Model 2) (%)	Total value relevance (Adjusted R^2) BV, CFO (Model 3) (%)	Incremental value relevance of CFO (Adjusted R^2 Model 1 – adjusted R^2 Model 2) (%)	Incremental value relevance of E (Adjusted R^2 Model 1 – adjusted R^2 Model 3) (%)	Relative value relevance of E and CFO Relative E versus CFO (Adjusted R^2 Model 2 – Adjusted R^2 Model 3) (%)	Vuong (1989) Z- statistics Model 2 versus Model 3 (earnings model versus CFO model)
<i>Panel A: all firms</i>							
Pooled	54.11	48.15	38.91	5.96	15.20	9.24	8.31 ***
2008-2009	59.07	51.21	37.24	7.86	21.83	13.97	18.307 ***
2006-2007	56.44	42.20	40.64	14.24	15.80	1.56	2.05 ***
2004-2007	52.38	41.12	38.87	11.26	13.51	2.25	3.987
Chow test:							
F-statistics	38.183 ***	31.172 ***	21.373 ***				
<i>Panel B: firms with positive earnings</i>							
Pooled	61.46	57.61	44.44	3.85	17.02	13.17	17.26 ***
2008-2009	69.94	63.44	42.60	6.50	27.34	20.84	21.91 ***
2006-2007	58.77	53.87	46.34	4.90	12.43	7.53	6.09 ***
2004-2007	57.98	51.84	45.76	6.14	12.22	6.08	5.99 ***
Chow test:							
F-statistics	31.387 ***	29.201 ***	17.946 ***				
<i>Panel C: firms with negative earnings</i>							
Pooled	32.05	27.14	26.33	4.91	5.72	0.81	1.72 *
2008-2009	26.78	25.97	18.42	0.81	8.36	7.55	9.18 ***
2006-2007	37.87	34.85	31.83	3.22	6.04	2.82	4.03 ***
2004-2007	38.72	34.77	31.92	3.95	6.80	2.85	5.37
Chow test:							
F-statistics	27.017 ***	25.174 ***	22.318 ***				

Notes: Significant at: *10, **5 and ***1 percent levels; Model 1: $MV_{it} = \alpha_{it} + \beta_1 BV_{it} + \beta_2 E_{it} + \beta_3 CFO_{it} + \lambda_1 + \lambda_2 + \lambda_3 + \lambda_4 + \lambda_5 + \lambda_6 + \lambda_7 + \lambda_8 + \lambda_9 + \lambda_{10} + \varepsilon_{it}$; Model 2: $MV_{it} = \alpha_{it} + \beta_1 BV_{it} + \beta_2 E_{it} + \beta_3 CFO_{it} + \lambda_1 + \lambda_2 + \lambda_3 + \lambda_4 + \lambda_5 + \lambda_6 + \lambda_7 + \lambda_8 + \lambda_9 + \lambda_{10} + \varepsilon_{it}$; Model 3: $MV_{it} = \alpha_{it} + \beta_1 BV_{it} + \beta_2 E_{it} + \beta_3 CFO_{it} + \lambda_1 + \lambda_2 + \lambda_3 + \lambda_4 + \lambda_5 + \lambda_6 + \lambda_7 + \lambda_8 + \lambda_9 + \lambda_{10} + \varepsilon_{it}$; incremental value relevance of CFO – adjusted R^2 of Model 1 – adjusted R^2 of Model 2; incremental value relevance of earnings – adjusted R^2 of Model 1 – adjusted R^2 of Model 3; relative value relevance of CFO – adjusted R^2 of Model 3 – relative value relevance of earnings – adjusted R^2 of Model 2; the definition of the relative value relevance of CFO and earnings is consistent with Black (2003); (adj. R^2 of adj. R^2) – relative explanatory power of the CFO model (Model 3) divided by relative explanatory power of the earnings model (Model 2); Vuong (1989) Z-statistics compares the earnings model (Model 2) and the CFO model (Model 3) as competing non-nested models; a positive and significant Z-statistic implies that the CFO model is rejected in favour of the earnings model; a positive Z-statistic implies that residuals produced by the CFO model (Model 3) is larger in magnitude than those of the earnings model (Model 2); levels of significance of the Z-statistics are determined based on a two tailed tests of probability distribution

Table III.
Changes in the relative
and incremental value
relevance of earnings and
CFO between the GFC
and the PCP and Vuong
Z-statistics

can explain 44.44 percent variation in share prices. For the negative earnings sample, book value and earnings together explain 27.14 percent variation in share prices, whereas book value and CFO together explain 26.33 percent variation in share prices. Thus, the relative explanatory power of the earnings model (Model 2) is higher than that of the CFO model (Model 3) by 9.24, 13.17 and 0.81 percent for combined sample, positive earnings sample and negative earnings sample, respectively.

It may be noted further that the relative explanatory power of earnings has increased, whereas the relative explanatory power of CFO has decreased during the GFC compared to the PCP. For example, for the combined sample, 41.12 percent variation in share prices is explained by book value and earnings together during the PCP which increases to 51.21 percent during the GFC. On the contrary, 38.87 percent variation in share prices is explained by book value and CFO together during the PCP, which decreases to 37.24 percent during the GFC. For the positive earnings sample, 51.84 percent variation in share prices is explained by book value and earnings together during the PCP which increases to 63.44 percent during the GFC. On the contrary, 45.76 percent variation in share prices is explained by book value and CFO together during the PCP, which decreases to 42.60 percent during the GFC. For the negative earnings sample, 34.77 percent variation in share prices is explained by book value and earnings together during the PCP which decreases to 25.97 percent during the GFC. On the contrary, 31.92 percent variation in share prices is explained by book value and CFO together during the PCP, which decreases to 18.42 percent during the GFC. These evidences suggest that the relative explanatory power of the earnings model (Model 2) is higher than that of the CFO model (Model 3) during both the GFC and the PCP.

Results for Model 2a and Model 3a are shown in Table IV. The adjusted R^2 of the earnings model is higher than that of the CFO model during both the GFC and the PCP. Positive and significant Vuong-Z-statistics[7] suggest that the earnings model is superior to the CFO model. Also the explanatory power of the earnings model has increased during the GFC, whereas the explanatory power of the CFO model has decreased during the GFC compared to the PCP. The results are essentially similar to the results obtained without controlling for the contextual factors.

Statistically significant and positive Vuong Z-statistic implies that residuals of the CFO model are larger in magnitude than those of the earnings model. Hence, the earnings model is preferred (superior) to the CFO model. Moreover, the ratio of the explanatory power of CFO to the explanatory power of earnings is less than 1 during both the GFC and the PCP which suggests that earnings has explanatory power superior to CFO during both the GFC and the PCP. These findings suggest that earnings has higher relative explanatory power than that of CFO during both the GFC and the PCP.

5.4 Impact of the GFC on the value relevance of earnings and CFO: test of question 3

Question 3 examines the impact of the GFC on the value relevance of earnings and CFO. Table V shows the result of Model 4. Both the explanatory power and the coefficient of earnings have increased during the GFC compared to the PCP. The coefficient of the interaction term CP^*E (β_6) in Model 4 is 2.495 for the combined sample, 2.740 for the positive earnings sample and -0.494 for the negative earnings sample. Hence, the coefficient of E has increased during the GFC by 2.495 for the combined sample, and by 2.740 for the positive earnings sample. For the negative earnings sample, both the coefficients of E (β_2) and CP^*E (β_6) are negative. Thus, the coefficient of earnings for

Earnings model	CFO model	Pooled sample		GFC (2008-2009)		PCP (2004-2007)	
		Earnings model (Model 2a)	CFO model (Model 3a)	CFO model (Model 3a) Earnings model (Model 2a)	CFO model (Model 3a)	CFO model (Model 3a) Earnings model (Model 2a)	CFO model (Model 3a)
α_{it}		0.574 *** (6.354)	0.623 *** (5.372)	0.483 * (1.842)	0.503 * (1.607)	0.634 *** (4.372)	0.714 * (1.692)
BV _{it} (β_1)		1.159 *** (13.310)	1.246 *** (9.170)	1.019 *** (14.280)	1.157 *** (10.195)	1.140 *** (6.273)	1.283 *** (8.634)
E _{it} (β_2)		3.251 *** (9.083)	1.896 *** (3.104)	3.597 *** (16.649)	1.749 *** (4.513)	3.169 *** (12.591)	1.925 *** (3.945)
CFO _{it}							
LEV _{it} * E _{it} *							
(β_3) LEV							
CFO _{it} * E _{it} *							
(β_4) SIZE							
ACC _{it} * E _{it} *							
(β_5) ACC							
CFO _{it}							
EP _{it} * E _{it} *							
(β_6) SIZE							
EP _{it} * CFO _{it}							
CFO _{it} * E _{it} *							
(β_7) CFOP							
CFO _{it}							
GRO _{it} * E _{it} *							
(β_8) GRO							
CFO _{it}							
Adj. R ²							
F-stats.							
Durbin							
Watson							

Earnings during
the GFC

Table IV.
Relative value relevance
of earnings and CFO: the
GFC and the PCP
comparison

(continued)

RAF
12,3

	CFO model	Earnings model	Pooled sample	GFC (2008-2009)	PCP (2004-2007)
	CFO model	Earnings model (Model 2a)	CFO model (Model 3a)	CFO model (Model 2a)	CFO model (Model 3a)
Vuong Z-stat.					
Model 2a vs Model 3a					
	13.608 ***	18.073 ***	11.385 ***		
Notes: Significant at: *10, **5 and ***1 percent levels; Model 2a: $MV_{it} = \alpha_{it} + \beta_1 BV_{it} + \beta_2 E_{it} + \beta_3 LEV^*E_{it} + \beta_5 ACC^*E_{it} + \beta_6 EP^*E_{it} + \beta_7 CFO^{OP}*CFO_{it} + \beta_8 GRO^*E_{it} + A_1...A_n + \varepsilon_{it}$; Model 3a: $MV_{it} = \alpha_{it} + \beta_1 BV_{it} + \beta_2 CFO_{it} + \beta_3 LEV^*CFO_{it} + \beta_5 SIZE^*CFO_{it} + \beta_6 ACC^*CFO_{it} + \beta_7 CFO^{OP}*CFO_{it} + \beta_8 GRO^*CFO_{it} + A_1...A_n + \varepsilon_{it}$; Vuong (1989) Z-statistics compares the earnings model (Model 2a) and the CFO model (Model 3a) as competing non-nested models; a positive and significant Z-statistic implies that the CFO model is rejected in favour of the earnings model; a positive Z-statistic implies that the residuals produced by the CFO model (Model 3a) is larger in magnitude than those of the earnings model (Model 2a); levels of significance of the Z-statistics are determined based on a two tailed tests of probability distribution; MV_{it} – market value of equity per share at end of the year (30 June); BV_{it} – book value per share at the end of year (30 June); E_{it} – net income per share for the year; CFO – cash flow from operations per share; α_{it} – intercept; LEV – dummy variable taking the value of 1 if the firm has above median leverage, 0 otherwise; leverage is measured as total liabilities divided by total assets; size – dummy variable taking the value of 1 if the firm has above median firm size, 0 otherwise; firm size is measured as firms' beginning of the year market value of equity; ACC – dummy variable taking the value of 1 if the firm has above median accruals and 0 otherwise; firms are partitioned into two groups each year based on the median of absolute value of accruals divided by the beginning of the year market value per share; firms lying above the median of $ TAC/MV_{t-1} $ are placed in high accruals group and firms lying below the median of $ TAC/MV_{t-1} $ are placed in the low accruals group; accrual is defined as net income minus CFO; EP – dummy variable taking the value of 1 if the firm has permanent earnings and 0 if the firm has transitory earnings; firms are partitioned into two groups based on their absolute value of the change in the net income divided by the absolute value of firms' market value for each year; firms lying below the median of $ \Delta NI / MV_{t-1} $ are placed in the permanent earnings group and firms lying above the median of $ \Delta NI / MV_{t-1} $ are placed in the transitory earnings group; CFO^{OP} – dummy variable taking the value of 1 if the firm has permanent CFO and 0 if the firm has transitory CFO; firms are partitioned into two groups based on their absolute value of the change in the CFO divided by the absolute value of firms' market value for each year; firms lying below the median of $ \Delta CFO / MV_{t-1} $ are placed in the permanent CFO group and firms lying above the median of $ \Delta CFO / MV_{t-1} $ are placed in the transitory CFO group; GRO – dummy variable taking the value of 1 if the firm has above median growth, 0 if the firm has below median growth; firms are separated based on the yearly median market to book value ratio; firms having above median market to book value ratio are placed in the high growth option group and firms having below median market to book value ratio are placed in the low growth option group					

	α	β_1	β_2	β_3	β_4	β_5	β_6	β_7	Adj. $R^2(\%)$	F-stats.
Panel A: all firms										
Pooled (2004-2009)	0.501*** (6.326)	1.442*** (31.762)	2.919*** (12.288)	2.332*** (27.111)	-0.403*** (-3.470)	-0.758*** (-29.081)	2.495*** (25.971)	-1.136*** (-11.272)	61.271	563.936***
Pooled (2006-2009)	0.445*** (4.183)	1.374*** (26.505)	2.500*** (10.043)	2.169*** (14.193)	-0.459*** (-3.339)	-0.790*** (-24.809)	2.075*** (6.472)	-0.774*** (-3.728)	57.48	447.912***
Panel B: positive earnings										
Pooled (2004-2009)	0.716*** (4.491)	1.269*** (23.465)	4.419*** (11.979)	2.231*** (18.436)	-0.830*** (-3.265)	-0.317*** (-9.025)	2.740*** (16.00)	-1.046*** (-11.178)	65.03	333.247***
Pooled (2006-2009)	0.172 (0.829)	1.251*** (10.860)	5.752*** (13.043)	1.661*** (8.343)	-0.286 (-1.005)	-0.399*** (-2.736)	1.431* (1.902)	-0.776*** (-5.160)	62.43	307.755
Panel C: negative earnings										
Pooled (2004-2009)	0.371*** (11.738)	0.760*** (19.375)	-0.238*** (-3.869)	1.286*** (3.980)	-0.091** (-1.992)	-0.350*** (-19.003)	-0.494 (-1.119)	-0.587*** (-2.319)	37.11	95.707***
Pooled (2006-2009)	0.347*** (7.958)	1.016*** (13.743)	-0.201** (-2.151)	0.564** (2.313)	-0.067 (-1.238)	-0.405*** (-13.582)	-0.532 (-1.089)	-0.334** (-2.226)	34.02	49.682***
Notes: Significant at: *10, **5 and ***1 percent levels; Model 4: $MV_{it} = \alpha_{it} + \beta_1 BV_{it} + \beta_2 E_{it} + \beta_3 CFO_{it} + \beta_4 CP + \beta_5 CP^*BV_{it} + \beta_6 CP^*E_{it} + \beta_7 CP^*CFO_{it} + \lambda_1 \dots \lambda_n + \varepsilon_{it}$; MV_{it} – market value of equity per share at end of the year (30 June); BV_{it} – book value per share at the end of year (30 June); E_{it} – net income per share for the year; CFO – cash flow from operations per share; CP – indicator variable taking the value of 1 for the year 2009 and 2008, and 0 for the year 2007, 2006, 2005 and 2004; an indicator variable for the GFC; α_{it} – intercept; ε_{it} – error term; $\lambda_1 \dots \lambda_n$ are indicator variables representing industry dummies										

Table V.
Impact of the GFC on the
value relevance of
earnings and CFO

negative earnings firms has negatively increased during the GFC compared to the PCP. The positive and significant coefficient of CP^*E (β_6) for the combined sample and for the positive earnings sample implies that the value relevance of earnings has increased during the GFC compared to the PCP.

It may be noted further that the coefficient of earnings (β_2) (in Model 1, Table II) has increased during the GFC compared to the PCP, for the combined sample, for the positive earnings sample and for the negative earnings sample. For the combined sample, the coefficient of earnings (β_2) has increased from 3.319 during the PCP to 4.575 during the GFC. For the positive earnings sample, the coefficient of earnings (β_2) has increased from 4.491 during the PCP to 5.321 during the GFC. For the negative earnings sample, the coefficient of earnings (β_2) has increased from -0.238 during the PCP to -0.733 during the GFC. Similar changes are observed for the coefficient of earnings (β_2) in Model 2. Moreover, the relative explanatory power of earnings (Model 2) has increased during the GFC compared to the PCP. For the combined sample, 41.12 percent variation in share prices is explained by book value and earnings together during the PCP which increases to 51.21 percent during the GFC. For the positive earnings sample, 51.84 percent variation in share prices is explained by book value and earnings together during the PCP which increases to 63.44 percent during the GFC. However, for the negative earnings sample, 34.77 percent variation in share prices is explained by book value and earnings together during the PCP which decreases to 25.97 percent during the GFC.

The coefficient of the interaction term CFO^*CP (β_7) in Model 4 are significant and negative. The coefficient of the interaction term CFO^*CP (β_7) is -1.136 for the combined sample, -1.046 for the positive earnings sample and -0.587 for the negative earnings sample. The negative and significant coefficient of CP^*CFO (β_7) suggests that the value relevance of CFO has decreased during the GFC compared to the PCP.

Also, the coefficient of CFO (β_3) (in Model 1, Table II) has decreased during the GFC compared to PCP for the combined sample, for the positive earnings sample and for the negative earnings sample. For the combined sample, the coefficient of CFO (β_3) has decreased from 2.532 during the PCP to 1.395 during the GFC. For the positive earnings sample, the coefficient of CFO (β_3) has decreased from 3.231 during the PCP to 2.184 during the GFC. For the negative earnings sample, the coefficient of CFO (β_3) has decreased from 1.286 during the PCP to 0.599 during the GFC. The results are essentially similar when the PCP is defined as 2006-2007. Moreover, the coefficient of CFO (β_3) (in Model 3, Table II) has decreased during the GFC compared to PCP. For the combined sample, the coefficient of CFO (β_3) has decreased from 3.816 during the PCP to 2.813 during the GFC. For the positive earnings sample, the coefficient of CFO (β_3) has decreased from 4.485 during the PCP to 3.826 during the GFC. For the negative earnings sample, the coefficient of CFO (β_3) has decreased from 1.171 during the PCP to 0.411 during the GFC.

Corroborating evidence is found if we compare the relative explanatory power of Model 3 (reported in Table III, Panels A-C) between the GFC and the PCP. Of particular note is that the relative explanatory power of CFO (adjusted R^2 of Model 3) has decreased during the GFC compared to the PCP. For the combined sample, 38.87 percent variations in share prices is explained by book value and CFO together during the PCP, whereas during the GFC, book value and CFO together explain 37.24 percent variations in share prices. For the positive earnings sample, 45.76 percent variation in share prices can be explained by book value and CFO during the PCP which declines to 42.60 percent during the GFC. For the negative earnings sample, 31.92 percent variation in share prices

can be explained by book value and CFO during the PCP which declines to 18.42 percent during the GFC. It may be noted further in Table III that the ratio of the relative explanatory power of CFO to the relative explanatory power of earnings has decreased from 0.95 during the PCP to 0.73 during the GFC for the combined sample. Similar trend is observed for the positive earnings sample and the negative earnings sample.

Thus, the changes in the relative explanatory power of Model 2 between the GFC and the PCP, the positive and significant coefficients of E^*CP (β_6) in Model 4, the increase in the coefficient of earnings (β_2) between the GFC and the PCP in Models 1 and 2 suggest that the value relevance of earnings has increased during the GFC compared to the PCP. Similarly, the changes in the relative explanatory power of Model 3 between the GFC and the PCP, the negative and significant coefficients of CFO^*CP (β_7) in Model 4 and the decrease in the coefficient of CFO (β_3) between the GFC and the PCP in Models 1 and 3 suggest that the value relevance of CFO has decreased during the GFC compared to the PCP. As reported in Table III, all F -values of the Chow-structural-break test are significant at 1 percent level indicating the existence of structural breaks in the association of share prices with book value, earnings and CFO between the GFC and the PCP.

Table VI shows results of Model 4a that examines the impact of the GFC on the value relevance of earnings and CFO after controlling for the effect of different contextual factors. The results are essentially unchanged even after controlling for the effects of firm size, leverage, accruals levels, earnings permanence, CFO permanence and growth options. The findings suggest that the value relevance of earnings decreases and that of CFO increases during a GFC compared to the PCP[8].

6. Discussions and conclusions

We have examined the relative superiority of earnings versus CFO during the GFC and the PCP and the impact of the GFC on the value relevance of earnings and CFO. The findings suggest that CFO has value relevance incremental to book value and earnings. Moreover, earnings is superior to CFO in explaining variations in share prices in the Australian market during both the GFC and the PCP. The value relevance of earnings has increased and that of CFO has decreased during the GFC compared to the PCP. Thus, earnings is considered superior to CFO for stock valuation purposes by the Australian investors during both the GFC and the PCP.

The superiority of earnings over CFO is consistent with prior Australian evidences during the normal economic condition that the longitudinal value relevance of earnings has not declined in the Australian market (Brimble and Hodgson, 2007; Goodwin and Ahmed, 2006) and the conclusion of Habib (2010) that earnings contains the most value relevant information over other six alternative performance measures in explaining security returns. The finding is also consistent with Choi *et al.* (2011) who find negative coefficients for CFO during the 1997 AFC for nine East Asian countries.

One reason for the decrease in the value relevance of CFO may be that CFO can be a noisy measure of firm performances during the GFC. Roychowdhury (2006) provides empirical evidence of firms' engaging in real activity management with implications for cash flows. Recent evidence in the behavioural accounting research (BAR) by Graham *et al.* (2005) may provide plausible other explanation for the increase in the value relevance of earnings and the decrease in the value relevance of CFO during the GFC compared to the PCP. Graham *et al.* (2005)[9] conducting a questionnaire survey

		Pooled (2004-2009)	Pooled (2006-2009)
BV _{it}	α	0.774 *** (8.696)	0.607 * (1.831)
E _{it}	β_1	1.121 *** (25.361)	1.174 *** (19.100)
CFO _{it}	β_2	2.403 *** (17.989)	2.531 *** (11.469)
CP	β_3	1.786 *** (3.504)	1.687 *** (3.275)
CP * BV _{it}	β_4	-0.327 *** (-3.349)	-0.379 *** (-3.134)
CP * E _{it}	β_5	-0.361 *** (-11.409)	-0.489 *** (-17.115)
CP * CFO _{it}	β_6	1.332 *** (4.443)	1.317 ** (2.453)
LEV * E _{it}	β_7	-0.369 *** (-3.264)	-0.701 *** (-12.884)
LEV * CFO _{it}	β_8	0.054 (1.444)	0.074 ** (2.446)
SIZE * E _{it}	β_9	0.042 (1.352)	0.068 *** (3.784)
SIZE * CFO _{it}	β_{10}	-0.342 *** (-4.443)	-0.217 ** (-2.453)
ACC * E _{it}	β_{11}	-0.515 *** (-12.803)	-0.474 *** (-8.446)
ACC * CFO _{it}	β_{12}	0.359 * (1.859)	381 *** (11.409)
EP * E _{it}	β_{13}	-0.475 ** (-2.163)	-0.837 *** (-17.427)
EP * CFO _{it}	β_{14}	0.219 *** (5.053)	0.165 *** (2.531)
CFOP * E _{it}	β_{15}	-0.492 *** (-13.013)	-0.314 *** (-8.045)
CFOP * CFO _{it}	β_{16}	-0.281 *** (-4.350)	-0.265 ** (-3.215)
GRO * E _{it}	β_{17}	0.329 *** (11.310)	0.413 *** (9.517)
GRO * CFO _{it}	β_{18}	0.218 *** (5.053)	0.165 ** (2.531)
Adj. R ² (%)	β_{19}	-0.179 *** (-3.005)	-0.230 *** (-4.139)
F-stats.		80.33	78.77
Durbin Watson statistics		918.503 ***	847.723 ***
		2.217	2.293

Notes: Significant at: *10, **5 and ***1 percent levels; Model 4a: $MV_{it} = \alpha_{it} + \beta_1 BV_{it} + \beta_2 E_{it} + \beta_3 CFO_{it} + \beta_4 CP + \beta_5 P * BV_{it} + \beta_6 CP * E_{it} + \beta_7 CP * CFO_{it} + \beta_8 LEV * E_{it} + \beta_9 LEV * CFO_{it} + \beta_{10} SIZE * E_{it} + \beta_{11} SIZE * CFO_{it} + \beta_{12} ACC * E_{it} + \beta_{13} ACC * CFO_{it} + \beta_{14} EP * E_{it} + \beta_{15} EP * CFO_{it} + \beta_{16} CFOP * E_{it} + \beta_{17} CFOP * CFO_{it} + \beta_{18} GRO * E_{it} + \beta_{19} GRO * CFO_{it} + \lambda_1 \dots \lambda_n + \varepsilon_{it}$; MV_{it} – market value of equity per share at end of the year (30 June); BV_{it} – book value per share at the end of year (30 June); E_{it} – net income per share for the year; CFO – cash flow from operations per share; LEV – dummy variable taking the value of 1 if the firm has above median leverage, 0 otherwise; leverage is measured as total liabilities divided by total assets; size – dummy variable taking the value of 1 if the firm has above median firm size, 0 otherwise; firm size is measured as firms' beginning of the year market value of equity; ACC – dummy variable taking the value of 1 if the firm has above median accruals and 0 otherwise; firms are partitioned into two groups each year based on the median of absolute value of accruals divided by the beginning of the year market value per share; firms lying above the median of $|TAC/MV_{t-1}|$ are placed in high accruals group and firms lying below the median of $|TAC/MV_{t-1}|$ are placed in the low accruals group; accrual is defined as net income minus CFO; EP – dummy variable taking the value of 1 if the firm has permanent earnings and 0 if the firm has transitory earnings; firms are partitioned into two groups based on their absolute value of the change in the net income divided by the absolute value of firms' market value for each year; firms lying below the median of $|\Delta NI/MV_{t-1}|$ are placed in the permanent earnings group and firms lying above the median of $|\Delta NI/MV_{t-1}|$ are placed in the transitory earnings group; $CFOP$ – dummy variable taking the value of 1 if the firm has permanent CFO and 0 if the firm has transitory CFO; firms are partitioned into two groups based on their absolute value of the change in the CFO divided by the absolute value of firms' market value for each year; firms lying below the median of $|\Delta CFO/MV_{t-1}|$ are placed in the permanent CFO group and firms lying above the median of $|\Delta CFO/MV_{t-1}|$ are placed in the transitory CFO group; GRO – dummy variable taking the value of 1 if the firm has above median growth, 0 if the firm has below median growth; firms are separated based on the yearly median market to book value ratio; firms having above median market to book value ratio are placed in the high growth option group and firms having below median market to book value ratio are placed in the low growth option group

Table VI.

Impact of the GFC on the value relevance of earnings and CFO after controlling for the effects of leverage, size, accruals level, earnings permanence, CFO permanence and growth options

among 401 corporate financial executives find that managers are willing to “burn real CFO for the sake of reporting desired accounting number”. They find that the generally accepted accounting principles (GAAP) based earnings number, primarily the earnings per share, is the key metric upon which the market focuses. They argue that to reduce the cost of information processing due to information overload, investors focus on a simple benchmark upon which they can rely on to evaluate firms’ performances. During the GFC, the focus on a reliable benchmark such as earnings per share may increase due to the increase in the level of noise in other sources of information such as analysts’ forecasts (Sidhu and Tan, 2011).

These two recent evidences may suggest that firms have engaged in real transaction based CFO management during the GFC. The CFO may be managed via the adjustment of real activities such as by adopting investment strategies that expedite current year’s cash inflows with negative CFO consequences for future years. Managers may also defer current period’s cash outflows. During the GFC, firms’ real activity management may dominate the accounting based earnings management because, auditors and regulators will be cautious to the GAAP/International Financial Accounting Standards (IFRS) based accounting adjustments. The real activity management with CFO implications cannot be questioned by auditors and regulators. However, the market may anticipate the implications of the real activity managements and accordingly the market may discount CFO in determining share prices.

Another plausible explanation for the increase in the value relevance of earnings and the decrease in the value relevance of CFO during the GFC compared to the PCP may be the ability of earnings to timely reflect the underlying changes in firms’ performances due to the matching attribute of accruals earnings. Assets’ values are likely to decline during the GFC compared to the PCP. Security prices also decline to reflect the declines in assets’ values. The accruals-based earnings will reflect these declines in assets’ values in the form of asset impairments or holding losses. However, CFO tied to these losses will not be realised until future periods. Hence, during the GFC firms’ earnings more closely maps into security price changes than CFO. On the contrary, due to the inherent limitations of CFO in terms of matching revenues with expenses and losses, CFO lacks timely information to reflect the underlying firm performances. So investors’ reliance on CFO decreases during the GFC compared to the PCP. This explanation is, in fact, consistent with the conclusion of Jenkins *et al.* (2009) that due to the increase in conservatism in current earnings during periods of economic contraction, the value relevance of earnings increases. The above explanation is also consistent with the conclusion of Dechow (1994) that the explanatory power of earnings increases with the increase in the volatility of firms’ operating environment when the explanatory power of CFO suffers adversely because of the timing and mismatching problems.

Due to the inherent limitations of CFO in terms of matching revenues with expenses and losses, investors’ reliance on CFO may have decreased during the GFC compared to the PCP. On the other hand, if accrual arises due to firms’ aggressive earnings management and “big-bath” write-offs, the accruals should have made the reported earnings a noisy measure of firm performances. In that case, the value relevance of earnings should have decreased and that of CFO should have increased during the GFC compared to the PCP. The increase in the value relevance of earnings and the decrease in the value relevance of CFO buttress the importance of matching attributes of accruals in providing useful information to the market during periods of macroeconomic uncertainty.

Hence, the findings that the value relevance of earnings has increased and that of CFO has decreased may imply that the GFC has increased the volatility in operating environment rather than the increase in firms' earnings management.

The findings have important implications for investors, regulators and auditors. The increase in the value relevance of earnings during the GFC may suggest that it is the earnings number not the CFO that investors rely on in determining share prices during a period of macroeconomic uncertainty when information from other unregulated sources becomes noisy[10]. The sustained value relevance of earnings and the increase therein during the GFC compared to the PCP may suggest that the regulatory efforts should concentrate on the accuracy and precision of firms' reported earnings. Auditors should also pay more attention to the quality of their clients' reported earnings, since it is the key indicator upon which investors primarily rely on during the period of a macroeconomic disturbance like the GFC. Investors and analysts may also find this evidence useful for stock valuation purposes. Specifically, analysts should focus on the accuracy of earnings forecasts, since earnings is the key accounting variable explaining the highest percentage of variations in share prices. Moreover, the increase in the value relevance of earnings and the decrease in the value relevance of CFO should be a concern for regulators, auditors and investors. Given that there is less flexibility in manipulating CFO, it is important to understand why the value relevance of CFO has decreased during the GFC. It remains an important issue for future study to examine why the value relevance of earnings has increased and that of CFO has decreased during the GFC compared to the PCP. Future studies can also focus on other countries with different legal, institutional and enforcement backgrounds to truly comprehend the impact of the GFC on the value relevance of fundamental accounting information such as earnings and CFO.

Notes

1. Subramanyam and Venkatachalam (2007) examine the relative importance of earnings and CFO in equity valuation. In contrast to the prior studies that have used the stock returns or future CFO, Subramanyam and Venkatachalam (2007) use *ex-post* intrinsic value of equity as the criterion for comparison. *Ex post* intrinsic value of equity is determined adopting both the discounted dividend and residual income models. They claim that their measure of *ex-post* intrinsic value is not contaminated by the stock market's fixation on reported earnings. Their findings unambiguously indicate that accrual-based earnings dominate CFO as a summary indicator of *ex-post* intrinsic value.
2. Barton *et al.* (2010) examine the value relevance of sales, earnings, comprehensive income and CFO drawing data from 46 countries and find no single performance measure dominates for firms across the world. A performance measure becomes more relevant when it captures in direct and timely fashion information about cash flows.
3. Source: Yahoo finance: ASX All ordinaries index.
4. Difference in the adjusted R^2 between Models 1 and 2 is examined instead of Partial *F*-test because only one variable is added to Model 1 over Model 2. Partial *F*-test is required if more than one variables are added.
5. Habib (2010) shows an average of 48 percent of Australian firms reporting losses for the period of 1992 to 2005 with the year 2002 having the highest percentage of firms with negative earnings (56 percent). Balkrishna *et al.* (2007) examine the frequency and magnitude of losses among the Australian firms and find that around 40 percent of the sample firm-years from 1993 to 2003 have reported losses with losses being highly persistent for several consecutive years.

6. If the correlation coefficient between any two independent variables is of the magnitude of 0.80 to 0.90, it may cause concern about multicollinearity problem in the regression.
7. To examine the relative superiority of the value relevance of earnings and CFO, the Vuong (1989) test is applied for comparing the competing Models 2 and 3. The Vuong (1989) likelihood ratio test (Z-statistic) helps to identify which one of the competing models has greater explanatory power. Dechow (1994, Appendix 2) shows that this directional model selection technique tests the null hypothesis that the explanatory powers of the two competing models are the same against the alternative hypothesis that one of them has more explanatory power. For example, if Model A and Model B are two competing models, under the Vuong (1989) test, Model A will be preferred to Model B if the average log likelihood of Model A is significantly higher than that of Model B and vice versa. The calculation procedures of Vuong (1989) likelihood ratio are discussed below in brief.

As a first step, the difference in the log likelihood between Model A and B is considered in the following way:

$$LR = \log[L(R_A)] - \log[L(R_B)]$$

As a second step, an estimate of the variance of LR, ω^2 is computed in the following way:

$$\hat{\omega}^2 = \frac{1}{n} \sum_{i=1}^n \left(\sum_{i=1}^n \left(\frac{1}{2} \log(\hat{\sigma}_B^2) - \frac{1}{2} \log(\hat{\sigma}_A^2) \right) + \frac{1}{2} \frac{(\hat{e}_{Bi})^2}{\hat{e}_B^2} - \frac{1}{2} \frac{(\hat{e}_{Ai})^2}{\hat{e}_A^2} \right) - \left(\frac{1}{n} LR \right)^2$$

where $\hat{\sigma}^2$ and e denote the estimates of the residual variance and the estimated residuals, respectively.

As a third step, the following equation determines Vuong Z-statistic:

$$Z = \frac{1}{\sqrt{n}} \frac{LR}{\hat{\omega}}$$

If the Z-statistic is positive and significant, Model A has a greater explanatory power than Model B. If the Z-statistic is negative and significant, Model B has a greater explanatory power than Model A. If the Z-statistic is not statistically significant, there is no difference in the explanatory power of the two competing models. A positive Z-statistic implies that the residuals produced by Model B are larger in magnitude than those from Model A.

Pertinent to this study, the explanatory power (adjusted R^2) of Models 2 and 3 will be compared in terms of Vuong Z-statistic. If the Z-statistic is positive and significant, Model 2 can be said to have superior explanatory power to Model 3. If the Z-statistic is negative and significant, Model 3 can be said to have superior explanatory power to Model 2. If the Z-statistic is not significant, the explanatory power of Models 2 and 3 are not different. A positive Z-statistic implies that residuals produced by the CFO model (Model 3) are larger in magnitude than those from the earnings model (Model 2).

8. For robustness analysis, Models 1-4 are estimated with several alternative specifications. The results are robust to the consideration of the issue of non-linearity (Chandra and Ro, 2008; Habib, 2010), fixed effect panel estimation, use of undeclared variables, and to the consideration of alternative year end (September, 30). The results are essentially unchanged (not reported for brevity).
9. Based on a questionnaire survey among 401 American corporate financial executives, Graham *et al.* (2005) find that 80 percent of the surveyed financial executives report that they would prefer cutting discretionary expenses such as advertising, R&D and maintenance, 55.33 percent of the executives report that they would rather delay starting of a new project to meet an earnings target, whereas 40 percent of the respondents report that they would book sells in the current quarter rather than in the next quarter if justified in both quarter, 22 percent

of the respondents report that they would postpone taking an accounting charge and 20 percent of the respondents report that they would sell investment or assets to record gains in the current quarter. Surprisingly, less than 10 percent of the executives prefer accounting adjustment to increase reported earnings.

10. Sidhu and Tan (2011) examine analysts' forecast error between the GFC and the PCP and find an increase in the forecast error during the GFC compared to the PCP.

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About the authors

Md Khokan Bepari obtained his PhD in Accounting from Central Queensland University, Australia. He has published in different refereed international journals and conferences and teaches Financial Accounting, Corporate Accounting and Management Accounting courses. Md Khokan Bepari is the corresponding author and can be contacted at: khokan552@yahoo.com

Sheikh F. Rahman is a Professor in Accounting in the Central Queensland University, Australia. He obtained his PhD in Accounting from the University of Manchester. He has published in different refereed international journals and conferences and teaches Financial Accounting and Corporate Accounting courses.

Abu Taher Mollik is an Assistant Professor Finance in the University of Canberra. He obtained his PhD from Australian National University. He has published in different refereed international journals and conferences and teaches Finance, Banking and Investment courses.