The Decline In Matching And Earnings' Ability To Forecast Operating Cash Flows

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ABSTRACT

Recent research has documented the decline of matching in financial reporting during the last few decades. The FASB has argued that earnings should provide investors and creditors with an ability to assess the amounts, timing, and uncertainty of cash flows to the organization (1978). This research investigates whether the decline in matching has affected the ability of earnings to forecast operating cash flows. Results indicate that earnings from earlier periods in which matching was better can be used to make more accurate predictions of operating cash flows than can earnings from later periods with poorer matching. Additionally, the more frequent recognition of special items in later periods also damages the ability of earnings to predict operating cash flows.

Keywords: Accounting Matching; Revenue and Expense Correlation; Operating Cash Flows; Cash Flow Prediction

INTRODUCTION

In accounting, the matching principle calls for expenses to be recognized in the same fiscal period as related revenues. There exists a cause and effect relationship between many expenses and revenues. Dichev and Tang (2008; hereafter DT) found that matching has been in steady decline over the last 40 years. Building on this research, Donelson, Jennings, and McInnis (2011: hereafter DJM) concluded that the increased role of special items in financial reports has been a more important factor in the decrease of matching than has the adoption of specialized accounting standards.

We extend this research into the area of cash flow prediction. The FASB has long maintained that accounting information should prove useful to investors and creditors in assessing future cash flows (FASB, 1978). We employ this cash flow prediction criterion to investigate whether the decrease in matching has damaged earnings' usefulness in forecasting cash flows.

LITERATURE REVIEW

DT concluded that poor matching distorts the cause and effect relationship that exists between expenses and revenues. Consequently, poor matching decreases the correlation between contemporaneous expenses and revenues. Periods exhibiting better matching have higher correlations between revenues and expenses than do periods in which matching is poorer. DT's inference is based on the relationship between firms' revenues and expenses from 1967-2003. The authors found that the correlation between revenues and expenses for firms from the period 1967-1985 is significantly higher than the correlations from 1986-2003 and concluded that matching of expenses with revenues was significantly poorer for the latter period. DT further state that poor matching results in increasing earnings volatility, decreasing earnings persistence, and argue that if "this trend continues unabated . . . the forward-looking informativeness of earnings will be simply destroyed" (p. 1455). The authors also cite standard-setters' movement from an income statement focus and toward a balance sheet emphasis, one likely cause of the decline in matching, may play a significant role in the diminishing informativeness of earnings.

Extending DT's research, DJM confirmed the dramatic decrease in the contemporaneous correlation between expenses and revenues and other changes in earnings properties. However, DJM argue that most of this

decline in matching results from "an increase in the incidence of large special items" (p. 945) rather than from adoption of new accounting standards.

METHODOLOGY

There exists a lengthy history of researchers who, based on the FASB's (1978) encouragement, have evaluated accounting information relative to its relationship to cash flows (e.g., Greenberg, Johnson, & Ramesh, 1986; Murdoch, Krause, & Costa, 1993; Finger, 1994; Lorek & Willinger, 1996; Dechow, Kothari, & Watts, 1998; Waldron & Jordan, 2010). We employ a similar method and bisection of annual fiscal year financial information to determine whether earnings from periods of better matching can be used to make more accurate forecasts of operating cash flows than can be accomplished utilizing earnings associated with periods of poorer matching. Additionally, we compare the information content (with respect to cash flow prediction) of two earnings variables—one that includes and one that excludes the impact of special items.

The entire period investigated by DT involved the years from 1967 to 2003. Similarly, DJM analyzed the years from 1967-2005. We do not analyze years prior to 1987 because preparation of a statement of cash flows and disclosure of operating cash flows was not mandated until Statement of Financial Accounting Standards No. 95 (1987) was issued. Although firms were required to present operating cash flows beginning in 1988, a sizable number adopted SFAS No. 95 early (i.e., in 1987). Consequently, we begin our investigation with 1987 data and, to allow for comparisons with earlier research, extend the analysis period through 2005.

DT separated their analysis into two periods—1967-1985 and 1986-2003. DJM divided their data into two periods as well—1967-1985 and 1986-2005. Since operating cash flow data are not available from 1967-1986, we separate our data into the two periods, 1987-1996 and 1997-2005. Of course, while significantly different matching occurred during the 1967-1985 and the 1986-2005 periods, as has been established by prior research, we initially address whether the two halves of the 1987-2005 financial statement information analyzed herein also exhibit significantly different matching. To establish matching differences for the two periods analyzed (1987-1996 and 1997-2005), we observe the correlation between revenues and two expense measures from the 1987-1996 period and compare it to the correlation for the 1997-2005 period. This is a similar process used by DT and DJM.

DT's research was "limited to a large-firm time-series specification" (p. 1453). These are points of difference from the current study. Data analyzed herein are cross-sectional and we include all firms for which pertinent data are available rather than limiting the sample to large firms. As such, any conclusions may add to knowledge related to cross-sectional and firm size differences.

Our primary analysis addresses whether better matching allows earnings to be used to make better cash flow predictions. Operating cash flow is the dependent variable. Two different earnings variables are utilized and compared as independent variables. With respect to changes in matching and associated changes in earnings volatility and persistence, DJM concluded "that changes in the frequency of economic events associated with special items have played a more important and sustained role relative to the role played by adoption of individual accounting standards" (p. 945). Consequently, we employ both an earnings variable that incorporates the effect of special items, and one that does not contain this effect, as predictive variables. Comparing these two earnings measures allows us to discern whether matching enhances, and whether special items damage, predictive information content for operating cash flows.

The data for this study are acquired from the Compustat database (Standard and Poor's, 2006). Required variables are total assets (data item #6), net sales revenue (data item #12), special items (data item #17), income before extraordinary items (data item #18), and net cash flow from operating activities (data item #308). Two measures of total expenses are calculated by subtracting the two earnings measures being examined, income before extraordinary items and "recurring earnings" (income before extraordinary items minus special items), from net sales revenue, again replicating DT's and DJM's method. We use the term "recurring earnings" as an earnings measure to denote earnings that excludes nonrecurring items. Examples included by Compustat as special items are discontinued operations, gains and losses on the sale of assets, relocation and moving expenses, write-offs of receivables, and other items deemed to be nonrecurring.

One-, two-, and three-year forecast horizons are used to evaluate the importance of correct matching to forecasts of operating cash flow. The following cross-sectional regressions are employed to predict operating cash flows for each of the two periods investigated (1987-1996 and 1997-2005) and for each of the three forecast horizons (one-, two-, and three years ahead):

$$CFO_t = a + b_1(IBEI_{t-i}) + \varepsilon$$
$$CFO_t = a + b_1(REarn_{t-i}) + \varepsilon$$

where: CFO = net cash provided (or used) by operating activities
IBEI = income before extraordinary items
REarn = recurring earnings (income before extraordinary items minus special items)
t = subscript denoting year of measurement
i = subscript denoting years lagged (1, 2, or 3)
ε = residual error

Other variable designations not included in the regressions just presented are total assets (TA), net sales revenue (Rev), special items (SI), Rev – IBEI (Exp1), and Rev – IBEI + SI (Exp2). All variables are deflated by TA as a control for size. None of the defined variables are differenced. DT and DJM do not employ differenced variables and, in predictions of earnings and cash flows, Finger (1994) found similar results regardless of whether dependent and independent variables were differenced.

SAMPLE SELECTION

The sample is drawn from the Compustat database and is initially restricted to firm-years for which all five of the aforementioned variables (total assets, net sales revenue, special items, income before extraordinary items, and net cash flow from operating activities) for the years1987-2005 are available. The number of firm-year observations with all required data and further eliminations from the sample, with the reasons for these eliminations, are provided in Table 1.

We adhere to the same process used by DT and by DJM to mitigate the effect of outliers. That is, to eliminate the influence of extreme sample observations, we delete the largest and smallest 1% of CFO and related firm-year observations.

Table 1
Sample Derivations for Forecasts of CFO_t from $Earnings_{t-1, t-2, \& t-3}$

Firm-years with available TA, Rev, IBEI, SI, and CFO for 1987-2005		138,787
Firm-years eliminated by trimming the top & bottom 1% of variables		(2,776)
Firm-years remaining prior to splitting sample into early and later periods		136,011
Years included in each sample	1987-1996	1997-2005
Firm-years included in each period's sample	65,478	70,533
Firm-years without a t-1 match	(15,555)	(14,281)
Firm-year paired observations for 1-year ahead forecasts	49,923	56,252
Firm-years without a t-2 match	(12,329)	(12,172)
Firm-year paired observations for 2-year ahead forecasts	37,594	44,080
Firm-years without a t-3 match	(9,504)	(10,111)
Firm-year paired observations for 3-year ahead forecasts	28,090	33,969

Subsequent to eliminating outliers, we sort the sample into two parts based on the earlier period (1987-1996) and the later period (1997-2005). As previously discussed, we expect the earlier period to have better matching of expenses with revenues than does the later period. Of course, with each lag of the independent variable relative the dependent variable, observations are lost. Firms that have only one year of data are eliminated because there are no prior earnings variables (income before extraordinary items or recurring earnings) from which to forecast operating cash flows. Similarly, firms that have at least one prior year of earnings data to be employed in forecasting one-year ahead operating cash flows do not necessarily have earnings variables two or three years prior.

That is, with each additional predictive lag, more observations are eliminated and fewer observations are available to make operating cash flow predictions.

RESULTS

Descriptive Statistics

Descriptive statistics for variables related to comparing the degree of matching between the earlier (1987-1996) and later (1997-2005) periods are contained in Table 2. The means and standard deviations for the t-2 forecast periods are based on subsets of data from the t-1 forecast period. Likewise, the statistics from the t-3 period are subsets of the t-1 and t-2 data. The reader is reminded that data are lost with each additional lag, consequently fewer observations are available to compute the later lag statistics. See Table 1 for the number of observations for each.

Table 2
Descriptive Statistics for Deflated Rev_{t-i}, $Exp1_{t-i}$, & $Exp2_{t-i}$, Variables

		i = 1		*i* = 2		*i* = 3	
Variable	**Period**	**Mean**	**Standard Deviation**	**Mean**	**Standard Deviation**	**Mean**	**Standard Deviation**
Rev_{t-i}	1987-1996	1.168	1.060	1.177	1.072	1.176	0.969
Rev_{t-i}	1997-2005	1.037	1.004	1.033	0.969	1.036	0.962
$Exp1_{t-i}$	1987-1996	1.220	1.158	1.225	1.185	1.214	1.015
$Exp1_{t-i}$	1997-2005	1.165	1.226	1.142	1.147	1.134	1.124
$Exp2_{t-i}$	1987-1996	1.201	1.130	1.204	1.154	1.194	0.997
$Exp2_{t-i}$	1997-2005	1.134	1.142	1.111	1.070	1.104	1.050

We observe in Table 2 that Exp2 means and standard deviations are smaller than the corresponding Exp1 amounts. These differences, of course, are due to special items. Since special items do not affect Exp2 values, it is an indication that special items are typically losses.

Table 3 displays similar means and standard deviations as included in Table 2, but for the two previously defined earnings measures (IBEI and REarn) and CFO. Mean REarn is higher than mean IBEI for both the earlier and later periods, again indicating that special items are typically losses. Furthermore, the larger Exp1 compared to Exp2 standard deviations (Table 2) indicate that special items increase variation in expenses and result in greater variability in earnings, as evidenced by higher standard deviations for IBEI compared to REarn (Table 3).

Table 3
Descriptive Statistics for Deflated Dependent (CFO_t) and Independent ($IBEI_{t-i}$ & $REarn_{t-i}$) Variables

		i = 1		*i* = 2		*i* = 3	
Variable	**Period**	**Mean**	**Standard Deviation**	**Mean**	**Standard Deviation**	**Mean**	**Standard Deviation**
$IBEI_{t-i}$	1987-1996	-0.052	0.431	-0.029	0.269	-0.022	0.250
$IBEI_{t-i}$	1997-2005	-0.122	0.802	-0.105	0.685	-0.094	0.699
$REarn_{t-i}$	1987-1996	-0.032	0.371	-0.017	0.236	-0.011	0.225
$REarn_{t-i}$	1997-2005	-0.094	0.667	-0.078	0.603	-0.067	0.626
CFO_t	1987-1996	0.019	0.201	0.028	0.186	0.035	0.174
CFO_t	1997-2005	-0.007	0.253	0.004	0.234	0.012	0.225

Comparing Matching of the Earlier and Later Period

Because "poor matching decreases the correlation between contemporaneous revenues and expenses" (DT, p. 1425), we compare such correlations for the earlier and later periods, over the three cash flow prediction lags, to confirm that better matching occurred for the earlier than for the later period (1997-2005). Table 4 displays these comparisons.

In Table 4, one can observe that every correlation for the earlier period (1987-1996) is higher than for the corresponding correlation in the later period (1997-2005). All *Z*-values comparing these differences are extremely significant. These results replicate those of DT and DJM, confirming that the level of matching, as measured by the correlation between revenue and expense, continues to decline. All correlation differences are extremely significant.

Table 4

Comparisons of Contemporaneous Correlations between Revenues (Rev) and Expenses (Exp1 & Exp2) for Better Matching (1987-1996) versus Poorer Matching (1997-2005) Periods

Time Period	*n*	Correlated Variables	Correlation Coefficient	*Z*-value[a]	Sig.
		Panel A (t-1)			
1987-1996	49,923	Rev & Exp1	0.928	83.96	<.001
1997-2005	56,252		0.810		
1987-1996	49,923	Rev & Exp2	0.944	64.20	<.001
1997-2005	56,252		0.882		
		Panel B (t-2)			
1987-1996	37,594	Rev & Exp1	0.925	58.29	<.001
1997-2005	44,080		0.839		
1987-1996	37,594	Rev & Exp2	0.943	35.74	<.001
1997-2005	44,080		0.908		
		Panel C (t-3)			
1987-1996	28,090	Rev & Exp1	0.954	78.34	<.001
1997-2005	33,969		0.847		
1987-1996	28,090	Rev & Exp2	0.970	60.78	<.001
1997-2005	33,969		0.921		

[a]Z-value from comparing 2 correlations measured on independent groups.

Comparing the Effect Matching Has on Cash Flow Prediction

It is important to confirm that there is significantly better matching in the earlier period (or poorer matching in the later period) because it is central to our expectation that better matching provides an earnings number that is more predictive of future operating cash flows. There is a large body of research to indicate that earnings is useful in forecasting cash flows (e.g., Greenberg et al., 1986; Murdoch et al., 1993; Lorek & Willinger, 1996; and Barth, Cram, & Nelson, 2001). We investigate whether two earnings measures (IBEI and REarn) provide better forecasts of operating cash flows for the earlier than for the later period.

Table 5 presents comparisons of predictive information content for cash flows contained in IBEI and REarn for periods of better versus poorer matching. The correlations for both earnings variables associated with the different periods are displayed in Table 5. For every forecast horizon (t-1, t-2, and t-3), the correlation coefficient for the earlier period (1987-1996) is higher than it is for the later period (1997-2005) and all differences are extremely significant. These results are consistent with a conclusion that correct matching enhances earnings ability to predict operating cash flows.

Of course, the proportion of the variation in future CFO explained by IBEI and REarn is the square of the correlation coefficient (coefficient of determination). REarn explains about 29% ($.536^2$) of the variation in one-year ahead operating cash flows of the earlier period, the largest proportion explained for any of the forecasts. On the other extreme, IBEI only explains about 7 ½% ($.274^2$) of the variation in three-year ahead operating cash flows, the smallest proportion explained in any of the forecasts. It is important to note that in all regressions, both earnings variables are statistically significant in their ability to forecast operating cash flows across all three time horizons.

Table 5

Comparing Earnings From the Earlier Period (1987-1996) to that of the Later Period (1997-2005) to Evaluate the Benefit of Matching to the Predictive Information Content of Earnings

Time Period	*n*	*Predicted Variable*	Predictor Variable	Correlation Coefficient	*Z*-value[b]	Sig.
Panel A (t-1 Forecasts)						
1987-1996	49,923	CFO_t	$IBEI_{t-1}$	0.499	29.90	<.001
1997-2005	56,252	CFO_t	$IBEI_{t-1}$	0.349		
1987-1996	49,923	CFO_t	$REarn_{t-1}$	0.536	30.86	<.001
1997-2005	56,252	CFO_t	$REarn_{t-1}$	0.387		
Panel B (t-2 Forecasts)						
1987-1996	37,594	CFO_t	$IBEI_{t-2}$	0.451	20.99	<.001
1997-2005	44,080	CFO_t	$IBEI_{t-2}$	0.326		
1987-1996	37,594	CFO_t	$REarn_{t-2}$	0.487	24.99	<.001
1997-2005	44,080	CFO_t	$REarn_{t-2}$	0.343		
Panel C (t-3 Forecasts)						
1987-1996	28,090	CFO_t	$IBEI_{t-3}$	0.376	14.15	<.001
1997-2005	33,969	CFO_t	$IBEI_{t-3}$	0.274		
1987-1996	28,090	CFO_t	$REarn_{t-3}$	0.402	16.61	<.001
1997-2005	33,969	CFO_t	$REarn_{t-3}$	0.284		

[b]Z-value from comparing 2 correlations measured on independent groups.

Earnings Before Extraordinary Items, Recurring Earnings, and Cash Flow Prediction

DJM conclude that the trend toward poor matching (and the associated increase in earnings volatility and decrease in earnings persistence) is chiefly attributable to an increase in the recognition of special items. Given that it appears that poor matching damages earnings' ability to forecast operating cash flows, it is also likely that removing the impact special items have on earnings will improve cash flow prediction. It is also logical that because cash flows associated with special items are not classified as operating cash flows, the removal of special items from earnings should improve the predictive information content with respect to operating cash flows.

Table 6

Comparing Two Earnings Measures (IBEI & REarn) and Their Relative Information Content For Cash Flow Prediction

Time Period	*n*	*Predicted Variable*	Predictor Variable	Correlation Coefficient	*Z*-value[c]	Sig.
Panel A (t-1 Forecasts)						
1987-1996	49,923	CFO_t	$REarn_{t-1}$	0.536	26.27	<.001
1987-1996	49,923	CFO_t	$IBEI_{t-1}$	0.499		
1997-2005	56,252	CFO_t	$REarn_{t-1}$	0.387	20.21	<.001
1997-2005	56,252	CFO_t	$IBEI_{t-1}$	0.349		
Panel B (t-2 Forecasts)						
1987-1996	37,594	CFO_t	$REarn_{t-2}$	0.487	21.65	<.001
1987-1996	37,594	CFO_t	$IBEI_{t-2}$	0.451		
1997-2005	44,080	CFO_t	$REarn_{t-2}$	0.343	9.23	<.001
1997-2005	44,080	CFO_t	$IBEI_{t-2}$	0.326		
Panel C (t-3 Forecasts)						
1987-1996	28,090	CFO_t	$REarn_{t-3}$	0.402	13.51	<.001
1987-1996	28,090	CFO_t	$IBEI_{t-3}$	0.376		
1997-2005	33,969	CFO_t	$REarn_{t-3}$	0.284	5.06	<.001
1997-2005	33,969	CFO_t	$IBEI_{t-3}$	0.274		

[c]Z-value from comparing two dependent correlations measured on the same subjects.

To examine this issue, we compare the predictive information content of IBEI and REarn within the same time periods. It can be observed in Table 6 that for each of the three forecast horizons, REarn's correlation

coefficients from the regressions of CFO_t on $REarn_{t-i}$ are greater than the corresponding correlation coefficients from the regressions of CFO_t on $IBEI_{t-i}$. All differences are extremely significant and we conclude that, with respect to cash flow forecasting, recurring earnings (i.e., earnings that does not include the effect of special items) is preferred to an earnings number that includes the impact of special items.

SUMMARY AND CONCLUSION

As Waldron and Jordan (2010) point out, the FASB has argued "that a primary purpose of financial reporting is to provide information useful in predicting future cash flows" (p. 95). Dichev and Tang (2008) and Donelson, Jennings, & McInnis (2011) have documented the decline of matching as an integral part of financial reporting over the last few decades. This research replicates the decline of matching and concludes such decline damages the ability of earnings to aid in the prediction of future cash flows, thus being counterproductive to the primary purpose of financial statements.

Of course, poor matching goes hand-in-hand with the issuance of accounting standards that, over the last few decades, have deemphasized the income statement in favor of a balance sheet approach. Also, changes in economic events associated with special item recognition have become more prevalent. Moreover, increases in earnings volatility and declining earnings persistence accompany poorer matching. That is, there are more than a few factors occurring simultaneously that have led to poor matching (Donelson et al., 2011).

It is not the aim of this research to assign weights to these various changes that have taken place over many years. We believe we present strong evidence that a decline in the quality of matching expenses with revenues over many years, regardless of the reasons for this decline, has resulted in a decline in the ability of earnings to be useful in the prediction of operating cash flows.

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