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Value relevance of alternative accounting performance measures: Australian evidence

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Abstract

Purpose – The paper aims to examine the value relevance of alternative accounting performance measures in Australia. It also documents the relative and incremental value relevance of revenue *vis-à-vis* earnings and the longitudinal changes in such value relevance. Finally, the impact of certain firm characteristics including firm life cycle on the value relevance of revenue and earnings information is investigated.

Design/methodology/approach – The paper utilises data on Australian listed companies from 1992 to 2005 on the level of and changes in seven alternative accounting performance measures. Standard ordinary least square regression is conducted.

Findings – Results reveal that: the coefficient estimates on all the performance measures are much higher for large firms compared to their small firm counterpart; the explanatory power of incremental revenue in explaining stock returns has declined significantly over the sample period; and life cycle analysis shows that the combined coefficients for both revenue and earnings are significant in the growth and maturity stages of the firm life cycle.

Practical implications – When making equity valuation decisions investors consider firms' fundamentals as reflected in financial statements. However, which line item is more important for equity valuation is an important consideration. From a regulatory perspective, this stream of research is quite relevant because standard setters will have evidence from an investor viewpoint about whether certain line items, subtotals, and totals should be defined in standards and required to be displayed in financial statements.

Originality/value – The paper adds to the existing capital market research in Australia by documenting differential persistence of alternative performance measures.

Keywords Australia, Accountancy, Performance measures, Asset valuation, Capital markets

Paper type Research paper

1. Introduction

This paper examines the value relevance of alternative accounting performance measures in Australia. Barton *et al.* (2008) estimate and compare the value relevance of a comprehensive set of performance measures commonly disclosed in financial statements across 46 countries including Australia during 1996-2005 and report that the value relevance of the performance measures varies substantially across line items in the income statement, as well as across countries. The authors report that operating income has the strongest association with contemporaneous stock returns; while subtotals at the ends of the income statement, such as sales and total comprehensive income, have the weakest association with stock returns.

This paper revisits and expands Barton *et al.* (2008) in the Australian context for a number of reasons. First, the Barton *et al.* (2008) study, like other international comparative studies, has the advantage of aggregating a large number of firm-year observations, which increases the statistical power of the tests. However, combining

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results from such a large and diverse set of countries also masks country-specific idiosyncracies. Furthermore, they assemble required data from the Global Vantage database, which is not as comprehensive as local databases (e.g. the Huntley Aspect database in Australia) because the former database does not cover many small and medium-sized listed companies. This is particularly important in the present study because there is likely to be significant differences in the persistence of individual performance measures between large and small firms. The present study uses Australian data that is twice the sample size of Barton *et al.* (2008). Second, USA evidence on the time-series behavior of the value-relevance of accounting information (particularly earnings) has produced inconclusive evidence. Collins *et al.* (1997) and Lev and Zarowin (1999) provide strong evidence that accounting earnings is losing value-relevance in the USA, and investors are focusing on alternative performance measures, like revenue, to evaluate company performance (Chandra and Ro, 2008)[1]. Brimble and Hodgson (2007, p. 602) investigate inter-temporal value relevance of accounting information in Australia hypothesising that:

> [...] firm conditions, competitive and economic structures, and business culture, vary significantly in a global sense. Hence, there is no compelling reason to assume that the US results will also hold in Australia.

Brimble and Hodgson (2007) fail to find any systematic decline in the value-relevance of earnings but do not examine the inter-temporal value relevance of revenue. Therefore, an empirical examination of the changing value relevance of revenue in Australia would be of interest. Third, although Australia has been studied in the comparative value-relevance research, extant studies use a single performance measure and a rather small Australian sample compared to the present study. For example, Hung (2001), Ali and Hwang (2000), and DeFond *et al.* (2007), among others, investigate the impact of shareholder protection on the properties of accounting information in a number of countries, including Australia. Results reveal that countries with strong investor protection and enforcement regimes (Australia, for example) provide accounting information that is more strongly associated with market returns.

This paper also addresses the role of firm-specific characteristics, like firm size, firm profitability and firm life cycle, in moderating the association between market returns and alternative firm performance measures. Specifically, this paper addresses four research questions:

RQ1. Which of the performance measures shows the strongest association with market returns, and how did the documented association vary over time?

RQ2. How does firm size affect value relevance of alternative performance measures?

RQ3. Is there any incremental value relevance of revenue *vis-à-vis* earnings and have there been any longitudinal changes in such value relevance?

RQ4. How do firm profitability and firm life cycle characteristics affect the incremental value relevance of revenue information? In addressing these questions, this paper considers seven alternative performance measures namely, total revenue (*TOTREV*), earnings before interest tax depreciation and amortisation (*EBITDA*), operating income proxied by earnings before interest and tax (*EBIT*), earnings before tax (*EBT*), net profit after tax but before

abnormal items (*NPATEXABN*), bottom line net income (*NPAT*) and operating cash flows (*OCF*).

Results reveal that both *EBT* and *NPAT* have the highest explanatory power while *EBT* has the largest combined coefficient (sum of the coefficient of the level and changes in *EBT*). Surprisingly, the combined coefficient for *TOTREV* is the lowest among all the coefficients, possibly implying lower persistence. Relative value relevance of alternative performance measures based on size classification reveals that coefficient estimates on all the performance measures are much higher for large firms compared to their small firm counterpart implying greater persistence for the former group. Larger firms tend to produce more persistent earnings information via smoothing of income as these firms have larger portfolios of accounting choices (Hodgson and Stevenson-Clarke, 2000). However, with respect to the adjusted R^2s, small firms exhibit higher explanatory power compared to large firms. This decline in adjusted R^2 from small to large companies could be explained by the fact that information pertaining to larger firms is readily available well before its actual announcement and is impounded into security prices instantaneously in an efficient market. Regarding incremental value relevance of revenue, the findings reveal that the combined ability of earnings and revenues to explain stock returns has not diminished, but the explanatory power of incremental revenue in explaining stock returns has declined significantly over the sample period. However, this result is primarily driven by young firms. Finally, life cycle analysis shows that the combined coefficients for both revenue and earnings are significant in the growth and maturity stages of the firm life cycle.

The results of this study will be of practical use to prospective investors and accounting regulators. When making equity valuation decisions investors consider firms' fundamentals as reflected in financial statements. However, which line item is more important for equity valuation is an important consideration. Because of differences in persistence among performance measures, investors need to know which of the measures is most strongly associated with investors' beliefs as reflected in stock market returns. From a regulatory perspective, this stream of research is quite relevant because standard setters will have evidence from an investor viewpoint "[. . .] whether certain line items, subtotals, and totals should be defined in standards and required to be displayed in financial statements" (Financial Accounting Standards Board, 2001).

The paper proceeds as follows. The next section provides a brief literature review. Section 3 explains the research design and sample selection procedure. Section 4 provides substantive test results and the final section concludes.

2. Related literature

Accounting earnings is the premier information item provided in the financial statements (Lev, 1989). Beginning with the seminal work of Ball and Brown (1968) and Beaver (1968), the last four decades of accounting research have produced a substantial volume of work showing that the market reacts positively to positive earnings news (earnings are value relevant) (see Kothari, 2001, for a review). However, published research on the value relevance of other line items in the income statement is rather limited. Available USA evidence generally is consistent with the view that disaggregated earnings provide more value-relevant information in the marketplace, and improve out-of-sample forecasting (Lipe, 1986; Wild, 1992; Barth *et al.*, 1992; Fairfield and Yohn, 1996). Lipe (1986), for example, reveals that the components

of earnings (namely, gross profits, general and administrative expense, depreciation expense, interest expense, income taxes, and other items) increase the explanatory power for security returns significantly. Fairfield and Yohn (1996) analyze accuracy improvements in out-of-sample forecasts of one-year-ahead return-on-equity. They find forecast improvements from progressively disaggregating earnings into the components of operating income, non-operating income plus taxes, special items and nonrecurring items.

Revenue is the first line item in the income statement which arises in the course of ordinary business activities and, therefore, is likely to be more persistent than other measures. Published research on the value relevance of revenue is sparse relative to research on earnings. Although earnings is widely considered to be the primary summary measure of operating performance for firms, revenue may contain incremental information beyond earnings that is relevant to future earnings and cash flows predictions but lost when aggregated into earnings with expenses. Several early studies (Hopwood and McKeown, 1985; Hoskin *et al.*, 1986; Wilson, 1986) find no evidence that revenue conveys information beyond earnings. Swaminathan and Weintrop (1991), however, find that revenue surprises explain excess returns around earnings announcements after controlling for earnings surprises[2]. Ghosh *et al.* (2005) report that, for a subsample of firms with sustained earnings increases and sustained revenue growth are associated with higher earnings response coefficients (ERCs), increased earnings persistence and reduced susceptibility to earnings management. Ertimur *et al.* (2003) reveal that the market reaction to revenue surprises is greater than to expense surprises, especially for growth firms, and that the differential price reaction is associated with relative persistence. Jegadeesh and Livnat (2006) find that past revenues are informative in explaining future earnings after controlling for past earnings. They further document that stock prices and analysts' forecasts adjust to the information conveyed by revenue over an extended period – of approximately six months – after quarterly earnings announcements. Chandra and Ro (2008) show that revenue is useful both as a summary measure for valuation purposes (has value relevance) and in conveying new information (has information content) to the market, after controlling for earnings information. These results are not driven by technology firms, extreme earnings news or loss situations, nor by model misspecification because of nonlinearities. They also report that while the combined ability of revenue and earnings to summarise contemporaneous value relevant information has remained stable over time, the value relevance of new information conveyed by earnings has declined whereas the ability of revenue to incrementally convey new value relevant information has not diminished.

Value relevance of accounting information, however, is expected to be determined by firm-specific characteristics like firm size, firm profitability, firm leverage, firm life cycle, and many others. Firm size has been extensively researched in explaining value relevance of accounting information (Atiase, 1985). Larger firms are characterised by a richer information environment and higher analyst following compared to their small firm counterparts. Because of the availability of more information for large firms prior to earnings announcements, earnings announcements of larger firms tend to generate fewer surprises in the marketplace and have a lower association with stock returns. Firm profitability is also considered to be an important contextual factor that affects the value relevance of accounting information differently. Extant research reports that

investors focus more on balance sheet information (e.g. equity book values) for the equity valuation of firms reporting losses (Collins *et al.*, 1999; Barth *et al.*, 1998). However, there is a paucity of research (Ghosh *et al.*, 2005; Chandra and Ro, 2008 are exceptions), and none in Australia, regarding investor valuation of revenue items when firms report negative earnings. Hayn (1995) calls for further research on the "degree of substitution between earnings numbers and *alternative accounting variables* in loss situations" (italics added). Finally, firm life cycle stages are used as important firm-specific characteristics that are likely to impact the value relevance of accounting information differentially because of differences in persistence among firms at different life cycle stages.

To sum up, available empirical evidence on the value-relevance of alternative accounting performance measures comes primarily from the USA. This paper expands this stream of research in Australia, where no evidence yet exists regarding the value relevance of different line items in the income statement, except for net income (Brimble and Hodgson, 2007). An additional contribution of this paper is to document the relative and incremental value relevance of revenue information *vis-à-vis* earnings and the longitudinal changes in such value relevance. Finally, the impact of certain firm characteristics including firm life cycle on the value relevance of revenue versus earnings information is investigated.

3. Research design and sample selection

The proxy for summary performance measure j's value *RELEVANCE* is the adjusted R^2 from the following regression:

$$RETURN_{it} = \gamma_0 + \gamma_1(Performance\ Measure\ j)_{it} + \gamma_2(\Delta Performance\ Measure\ j)_{it} + \gamma_{3\text{-}13} YRDUM + \gamma_{14\text{-}31} INDUM + \varepsilon_{it,} \quad (1)$$

where *RETURN* is firm i's stock return for fiscal year t, adjusted for average market return during the period[3], and performance measures $j \in \{TOTREV, EBITDA, OPINC, EBT, NPATEXABN, NPAT, OCF\}$ are deflated by the lagged market value of equity (MVE). The equation also includes change in performance measures as explanatory variables following Easton and Harris (1991). A set of year and industry dummy coefficients are included in equation (1) to control for period and industry effects. Larger values of *RELEVANCE* of the performance measure j imply that this particular measure is more relevant for equity valuation.

To determine the incremental value relevance of revenue information *vis-à-vis* earnings, the following three regression equations are estimated:

$$RETURN_{it} = \alpha_0 + \alpha_1 REVLEV_{it} + \alpha_2 REVGR_{it} + \alpha_3 EARLEV_{it} + \alpha_4 EARGR_{it} + \alpha_{5\text{-}13} YRDUM + \alpha_{14\text{-}31} INDUM + \varepsilon_{it} \quad (2)$$

where *REVLEV* and *EARLEV* are revenue and earnings levels, respectively, and *REVGR* and *EARGR* are revenue and earnings growth, respectively. *REVGR* and *EARGR* are calculated as the difference between current year revenue (earnings) and last year revenue (earnings) divided by lagged MVE, respectively. *EAR* is defined as operating earnings (*EBIT*). To compare the explanatory power that revenue and earnings have for stock returns, a decomposition technique used in Easton (1985) is employed. Total explanatory power (R^2_T) is decomposed into three parts:

(1) the incremental explanatory power of revenues (incremental *REV*);
(2) the incremental explanatory power of earnings (incremental *EAR*); and
(3) the explanatory power common to both revenues and earnings (incremental *COMMON*).

Stated in equation form:

$$RETURN_{it} = \beta_0 + \beta_1 REVLEV_{it} + \beta_2 REVGR_{it} + \beta_{3\text{-}11} YRDUM + \beta_{12\text{-}29} INDUM + \varepsilon_{it} \quad (3)$$

$$RETURN_{it} = \zeta_0 + \zeta_1 EARLEV_{it} + \zeta_2 EARGR_{it} + \zeta_{3\text{-}11} YRDUM + \zeta_{12\text{-}29} INDUM + \varepsilon_{it} \quad (4)$$

The coefficients of determination from equations (2) to (4) are denoted as R^2_T, R^2_{REV} and R^2_{EAR}, respectively. Then $R^2_T - R^2_{EAR} = INCREMENTAL\ REV$ and $R^2_T - R^2_{REV} = INCREMENTAL\ EAR$. The remaining $R^2_T - R^2_{IncrREV} - R^2_{IncrEAR}$ equals the explanatory power common to both earnings and book values *(COMMON)*.

The initial sample consists of 10,336 firm-year observations excluding financial institutions over a period of 1992 to 2005 and is retrieved from the Aspect Huntley database. Missing MVE data reduces the sample by 1,927 firm-year observations. MVE data is required to deflate the performance measures. A further 57 observations are lost due to missing market adjusted return data and, finally, missing performance measures data reduces the sample size by a further 22 observations, resulting in a final usable sample of 8,330 firm-year observations. By comparison, Barton *et al.* (2008) conduct their analysis using a sample size of 4,193 firm-year observations. There is wide variation in the number of sample observations across the sample period, with 1992 having the lowest (136) while 2005 the highest (934) number of observations, respectively. Table I presents descriptive statistics, industry composition of the selected sample and correlation analysis among the variables. These statistics are computed after winsorising the top and bottom 1 percent of the distribution of all the variables to reduce the effect of outliers. Mean return is positively skewed (skewness = 2.30), so is *TOTREV* (skewness = 3.45). However, *NPATEXABN* and *NPAT* are negatively skewed (skewness = −2.71 and −3.37, respectively), reflecting large negative earnings values. All the variables have high kurtosis (kurtosis coefficients are in the range of 8.07-19.05). These statistics indicate that the distributions are not normally distributed even after winsorising the variables. Panel B of Table I reports industry composition, and clearly demonstrates that the Materials industry constitutes the largest number of unique firms (338) and firm-year observations (30 percent of the total sample), followed by the energy sector (8 percent of the total sample). The average life of the sample firms is seven years (8,330/1,170). Panel C of Table I presents the correlation analysis. All the reported correlations are statistically significant at better than the 1 percent level. Some of the performance measures are highly correlated among themselves, and therefore, used separately in regression analysis to avoid the multicollinearity problem.

4. Substantive test results

4.1 Value relevance of alternative performance measures

Table II shows the pooled regression estimates of value-relevance of seven alternative performance measures in terms of adjusted R^2 and coefficient estimates (both level

Table I.
Descriptive statistics and correlation analysis

Panel A: descriptive statistics					
Variables	*Mean*	*Median*	*SD*	*25%*	*75%*
MKTADJRET	0.097	−0.049	0.762	−0.351	0.303
TOTREV	1.591	0.507	2.919	0.027	1.743
EBITDA	0.036	0.016	0.380	−0.102	0.202
OPINC	−0.047	0.000	0.357	−0.134	0.129
EBT	−0.060	0.013	0.370	−0.142	0.118
NPATEXABN	−0.078	0.010	0.354	−0.141	0.088
NPAT	−0.136	0.001	0.524	−0.191	0.088
OCF	0.011	0.021	0.331	−0.105	0.137
Δ*TOTREV*	0.095	0.011	0.874	−0.023	0.204
Δ*EBITDA*	0.026	0.002	0.333	−0.043	0.065
Δ*OPINC*	0.049	0.006	0.366	−0.039	0.078
Δ*EBT*	0.034	0.007	0.366	−0.049	0.062
Δ*NPATEXABN*	0.029	0.005	0.371	−0.046	0.053
Δ*NPAT*	0.070	0.007	0.725	−0.063	0.076
Δ*OCF*	0.022	0.003	0.339	−0.059	0.071

Panel B: industry composition			
Industry	*Number of firms*	*Firm year observations*	*Percentage*
Automobiles and components	10	99	1.19
Capital goods	72	640	7.68
Commercial and consumer services	98	631	7.58
Consumer durables	16	115	1.38
Energy	90	718	8.62
Food, beverage, and tobacco	47	367	4.41
Health care equipments	49	280	3.36
Materials	338	2,503	30.05
Media	37	290	3.48
Pharmaceuticals and biotechnology	56	321	3.85

(continued)

Real estate	76	560	6.72												
Retailing	32	232	2.79												
Software and services	71	384	4.61												
Technology hardware	29	187	2.24												
Telecommunications	24	155	1.86												
Transportation	20	179	2.15												
Utilities	16	93	1.12												
Others	89	576	6.91												
Total	1,170	8,330	100												
Panel C: correlation analysis															
	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*	*(9)*	*(10)*	*(11)*	*(12)*	*(13)*	*(14)*	*(15)*
MKTADJRET (1)	1.000														
TOTREV (2)	0.094	1.000													
EBITDA (3)	0.098	0.420	1.000												
OPINC (4)	0.084	0.240	0.915	1.000											
EBT (5)	0.087	0.137	0.803	0.926	1.000										
NPATEXABN (6)	0.081	0.100	0.776	0.907	0.973	1.000									
NPAT (7)	0.089	0.044	0.577	0.713	0.774	0.779	1.000								
OCF (8)	0.084	0.299	0.636	0.584	0.551	0.527	0.429	1.000							
Δ*TOTREV* (9)	0.106	0.258	0.233	0.224	0.200	0.188	0.168	0.143	1.000						
Δ*EBITDA* (10)	0.135	0.147	0.392	0.342	0.319	0.310	0.232	0.152	0.225	1.000					
Δ*OPINC* (11)	0.135	0.256	0.379	0.322	0.240	0.232	0.175	0.169	0.084	0.848	1.000				
Δ*EBT* (12)	0.147	0.152	0.302	0.291	0.295	0.286	0.216	0.134	0.074	0.847	0.906	1.000			
Δ*NPATEXABN* (13)	0.139	0.125	0.280	0.277	0.285	0.305	0.221	0.104	0.054	0.810	0.863	0.949	1.000		
Δ*NPAT* (14)	0.142	0.134	0.126	0.113	0.107	0.103	0.306	0.050	0.030	0.473	0.558	0.595	0.612	1.000	
Δ*OCF* (15)	0.085	0.113	0.152	0.104	0.075	0.080	0.052	0.447	0.132	0.385	0.409	0.404	0.378	0.276	1.000

Notes: The sample consists of 8,330 firm-year observations excluding financial institutions over a period of 1992 to 2005 and is retrieved from Aspect Hantley database. All of the correlation coefficients are statistically significant at the 1 percent level (two-tailed tests). Variables are defined as follows: *MKTADJRET*, market-adjusted buy-and-hold annul return; *TOTREV*, total revenue of the firm; *EBITDA*, earnings before interest, taxes, depreciation, and amortization; *OPINC*, operating income; *EBT*, earnings before tax; *NPATEXABN*, net profit after tax but before abnormal items; *NPAT*, net profit after tax; *OCF*, operating cash flows reported in the direct method cash flow statement; all the independent variables have been deflated by lagged MVE

Table I.

as well as changes) based on equation (1). The regression also includes year and industry dummies to control for the possible year and industry effects. Reported results reveal that the value relevance of the *EBIT* and *NPAT* measures command the highest explanatory power of 8.2 percent, while the *OCF* measure has the lowest adjusted R^2 of 6.9 percent. The reported adjusted R^2 for the earnings measure is comparable to that of Easton and Harris (1991) who find an average R^2 of 7.8 percent when security return is regressed on both the level of, and changes in, earnings. With respect to the value relevance of revenue information, Chandra and Ro (2008) report an adjusted R^2 of 4.3 percent when both the revenue and earnings level, and growth, variables are included in the same regression whereas this study reports a much higher adjusted R^2 when revenue variables alone are included in the regression estimation. With respect to the coefficient estimates, Table II shows that all the combined coefficients are positive, and statistically significant at better than 1 percent level. The combined coefficients on *EBT* measure is the largest among all the performance measures (a combined coefficient of 0.37). The combined coefficient estimate for the revenue variable is very similar to that reported by Chandra and Ro (2008) (Figure 1).

4.2 Firm size and value relevance of alternative performance measures

This section provides evidence on how firm size affects the relative value relevance of alternative performance measures. Firm size has been extensively used in capital market research as a conditioning variable in explaining many financial reporting outcome effects. Firm-year observations are classified into small, medium, and large firm size groups based on yearly distribution of market value of equities. Then market-adjusted buy-and-hold annual stock returns are regressed on alternative performance measures in each of the size categories, and the resulting coefficients and adjusted R^2*s* are reported in Table III.

Coefficient estimates on all the performance measures are much larger for large firms compared to their small firm counterparts implying greater persistence for the former group. For example, the combined coefficient estimates for the revenue variable

Performance measures	Intercept		γ_1		γ_2		$[\gamma_1 + \gamma_2]$		Adjusted R^2
TOTREV	0.20*	(3.28)	0.02*	(6.10)	0.08*	(6.69)	0.09*	(8.18)	0.077
EBITDA	0.22*	(3.45)	0.13*	(3.77)	0.23*	(6.40)	0.36*	(9.00)	0.08
EBIT [OPINC]	0.22*	(3.52)	0.13*	(3.72)	0.21*	(6.40)	0.34*	(8.50)	0.08
EBT	0.24*	(3.91)	0.13*	(3.78)	0.24*	(7.01)	0.37*	(9.00)	0.082
NPATEXABN	0.25*	(4.05)	0.12*	(3.32)	0.23*	(6.65)	0.34*	(9.10)	0.079
NPAT	0.25*	(4.07)	0.10*	(4.00)	0.10*	(5.33)	0.20*	(7.81)	0.082
OCF	0.24*	(3.69)	0.14*	(3.73)	0.11*	(2.94)	0.25*	(6.23)	0.069
Observations	8,330								
Industry dummies	Included								
Year dummies	Included								

Table II.
Pooled regression results of the value relevance of alternative accounting performance measures

Note: Siginificant at: *1 percent level

$$RETURN_{it} = \gamma_0 + \gamma_1(Performance\ Measure\ j)_{it} + \gamma_2(\Delta Performance\ Measure\ j)_{it} + \gamma_{3-13} YRDUM + \gamma_{14-31} INDUM + \varepsilon_{it} \quad (1)$$

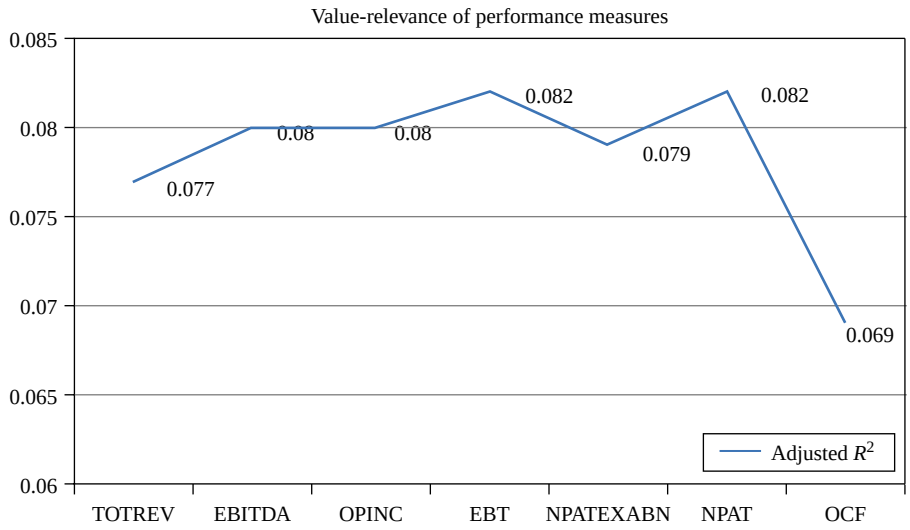

Figure 1. Value-relevance of alternative performance measures, proxied by adjusted R^2 from the regression of market-adjusted returns on seven accounting performance measures in Australia is depicted on the vertical axis

is 0.17 for large firms as compared to only 0.04 for small firms. Similarly, large (small) firms report combined coefficients of 0.59 (0.11) for the *NPAT* variable, respectively. Larger firms tend to produce more persistent earnings information via smoothing of income as these firms have a larger portfolio of accounting choices (Hodgson and Stevenson-Clarke, 2000). However, the opposite picture emerges with respect to the adjusted R^2*s* where performance measures of small firms exhibit higher explanatory power with respect to security returns compared to large firms. This decline in the adjusted R^2 from small to large firms may be explained by the fact information pertaining to larger firms is readily available well before the actual announcement, and is impounded into security prices. This is more applicable in Australia which is characterised by a "continuous disclosure regime".

4.3 Value relevance of revenue

This section provides empirical evidence on the ability of revenue to explain stock returns beyond earnings. As mentioned in the literature review section, published research on the value relevance of revenue is sparse relative to research on earnings, and is based primarily on the USA market. Table IV presents the Australian evidence on the relative and incremental value relevance of revenue *vis-à-vis* earnings. Pooled regression results with respect to equation (2) reveal that all four regression variables representing earnings and revenue levels and growth, enter the regression equation with positive coefficients (columns 2-6). They are statistically significant at better than the 5 percent level and explain about 9 percent of the variation in market-adjusted stock returns. Combined earnings coefficients, however, are much higher than their revenue counterparts (0.31 versus 0.09, respectively). Columns (7-9) report regression results of equation (3). Both the *REVLEV* and *REVGR* variables are positive and statistically significant at better than 1 percent level. The regression result of equation (4) in columns (10-12) reveals that the *EARLEV* and *EARGR* are also positive and statistically significant, and both the models explain about 8 percent of the variation

Table III.
Firm size and the relative value relevance of alternative performance measures

	Small firms				Medium firms				Large firms			
Measures	$\gamma_1 j$	$\gamma_2 j$	$[\gamma_1 j + \gamma_2 j]$	Adj. R^2	$\gamma_1 j$	$\gamma_2 j$	$[\gamma_1 j + \gamma_2 j]$	Adj. R^2	$\gamma_1 j$	$\gamma_2 j$	$[\gamma_1 j + \gamma_2 j]$	Adj. R^2
TOTREV	0.024*	0.016	0.04*	0.1084	0.015**	0.096*	0.11*	0.083	0.04	0.13*	0.17*	0.08
	(4.20)	(1.14)	(2.61)		(2.40)	(4.60)	(5.73)		(4.15)	(3.84)	(4.94)	
EBITDA	−0.04	0.18*	0.14*	0.1090	−0.13***	0.58*	0.45	0.10	0.22***	0.48*	0.69*	0.0745
	(−0.86)	(4.60)	(3.73)		(−1.66)	(6.70)	(5.65)		(1.95)	(3.00)	(3.95)	
OPINC	−0.03	0.15*	0.12*	0.1086	−0.22	0.57*	0.35	0.10	0.17	0.57*	0.74*	0.078
	(−0.78)	(4.27)	(3.19)		−(3.35)	(9.64)	(6.11)		(0.86)	(3.41)	(3.59)	
EBT	−0.03	0.19*	0.16*	0.1143	−0.14**	0.52*	0.38	0.0972	0.05	0.80*	0.85*	0.087
	(−0.72)	(5.22)	(4.20)		(−2.20)	(8.99)	(6.91)		(0.25)	(3.76)	(3.87)	
NPATEXABN	−0.03	0.19*	0.1628*	0.1186	−0.20	0.50*	0.30	0.0922	−0.0081	0.89*	0.89*	0.0916
	(−0.65)	(5.29)	(4.56)		(−3.03)	(8.45)	(5.26)		(−0.0020)	(3.76)	(3.47)	
NPAT	−0.0018	0.09*	0.09*	0.1142	0.0017	0.20*	0.20	0.0880	0.24	0.35*	0.59*	0.0955
	(−0.06)	(4.59)	(3.67)		(0.04)	(8.20)	(5.46)		(1.52)	(4.13)	(3.34)	
OCF	−0.029	0.12*	0.093*	0.1034	−0.006	0.23*	0.226	0.0751	0.23	0.20	0.43**	0.059
	(−0.61)	(2.77)	(1.77)		(−0.93)	(3.17)	(3.51)		(1.55)	(0.16)	(2.97)	
n	2,773				2,774				2,774			
Industry dummy	Yes				Yes				Yes			
Year dummy	Yes				Yes				Yes			

Notes: Significance at: *1, **5, and ***10 percent levels, respectively. Small firm group contains 2,773 firm-year observations while medium and large firm groups contain 2,774 firm-year observations, respectively, over 1992 to 2005. Each year firm-observation is classified into small, medium or large size groups based on the distribution of MVE. The proxy for summary performance measure *j*'s value *RELEVANCE* is the adjusted R^2 from the following regression:

$$RETURN_{it} = \gamma_0 + \gamma_1(Performance\ Measure\ j)_{it} + \gamma_2(\Delta Performance\ Measure\ j)_{it} + \gamma_{3-13}YRDUM + \gamma_{14-31}INDUM + \varepsilon_{it,} \quad (1)$$

$$RETURN_{it} = \gamma_0 + \gamma_1(Performance\ Measure\ j)_{it} + \gamma_2(\Delta Performance\ Measure\ j)_{it} + \varepsilon_{it,} \quad (2)$$

where *RETURN* is firm *i*'s stock return for fiscal year *t*, adjusted for average market return during the period, and performance measure $j \in$ {*TOTREV*, *EBITDA*, *OPINC*, *EBT*, *NPATEXABN*, *NPAT*, *OCF*}. Larger values of *RELEVANCE* imply that performance measure *j* is more relevant for equity valuation

Table IV.
Incremental value-relevance of revenue and earnings information

Year	Combined model α_1	α_2	α_3	α_4	R^2	Revenue model β_1	β_2	R^2	Earnings model ζ_1	ζ_2	R^2	(6-12) Incr_REV	(6-9) Incr_EAR
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
1992	0.0292***	0.11**	−0.41*	0.24***	0.08	0.02	0.11**	0.04	−0.37**	0.31	0.04	0.04	0.04
1993	−0.03***	0.13***	0.0046	0.15	0.0091	−0.03	0.15	0.01	0.00004	0.23	0.0008	0.0082	−0.0009
1994	0.02***	0.21*	−0.08	0.59**	0.10	0.012	0.25*	0.09	−0.05	0.69**	0.02	0.08	0.01
1995	0.03	0.23*	−0.84***	0.85**	0.04	0.04**	0.14**	0.03	−0.09	0.57***	0.0032	0.0368	0.01
1996	0.04*	0.0098	−0.06	1.66*	0.15	0.04*	−0.009	0.023	−0.04	1.64*	0.13	0.02	0.127
1997	0.02***	−0.005	0.48*	0.20	0.03	0.03**	0.03	0.01	0.48*	0.28	0.03	0.00	0.02
1998	0.01***	0.0043	0.38*	0.30**	0.10	0.03*	0.01	0.05	0.44*	0.35*	0.09	0.01	0.05
1999	−0.0054	0.13*	−0.20	0.29***	0.02	−0.01	0.14*	0.01	−0.13	0.34*	0.0088	0.011	0.01
2000	−0.02***	0.07*	−0.23**	0.42*	0.02	−0.01	0.07**	0.0038	−0.21**	0.41*	0.01	0.01	0.016
2001	0.03*	0.04	0.41*	0.10	0.13	0.04*	0.03	0.04	0.43*	0.09	0.10	0.03	0.09
2002	0.02*	0.09**	0.14**	0.11**	0.05	0.03*	0.09*	0.04	0.17*	0.12*	0.03	0.02	0.01
2003	0.0052	0.08*	−0.03	0.20*	0.02	0.0094	0.07**	0.0066	0.0097	0.20*	0.02	0.00	0.013
2004	0.0058	0.08*	0.190**	0.06	0.04	0.0100	0.09*	0.02	0.22*	0.07	0.03	0.01	0.02
2005	−0.02*	0.10**	0.10	0.17	0.01	−.02***	0.11*	0.0090	0.15***	0.13	0.0066	0.0034	0.0010
Average	0.01	0.10**	−0.01	0.38**	0.06	0.01	0.09	0.03	0.07	0.39	0.04	0.02	0.03
Av. SE	0.01	0.04	0.16	0.16		0.02	0.04**		0.14	0.15**			
t-stat	(0.91)	(2.10)	(−0.066)	(2.33)		(0.69)	(2.30)		(0.50)	(2.68)			
Pooled	0.02*	0.07*	0.09*	0.17*	0.09	0.02*	0.08*	0.08	0.12	0.19*	0.08	0.01	0.01
	(4.67)	(5.84)	(2.61)	(5.48)		(5.22)	(6.50)		(3.59)	(5.64)			

Notes: Significance at: *1, **5, and ***10 percent levels, respectively; to determine the incremental value relevance of revenue information *vis-à-vis* earnings, the following three regression equations are estimated:

$$RETURN_{it} = \alpha_0 + \alpha_1 REVLEV_{it} + \alpha_2 REVGR_{it} + \alpha_3 EARLEV_{it} + \alpha_4 EARGR_{it} + \varepsilon_{it}, \quad (2)$$

$$RETURN_{it} = \beta_0 + \beta_1 REVLEV_{it} + \beta_2 REVGR_{it} + \varepsilon_{it}, \quad (3)$$

$$RETURN_{it} = \zeta_0 + \zeta_1 EARLEV_{it} + \zeta_2 EARGR_{it} + \varepsilon_{it}, \quad (4)$$

where REVLEV and EARLEV are revenue and earnings levels, respectively, and REVGR and EARGR are revenue and earnings growth, respectively. Latter two variables are calculates as the difference between current year revenue (earnings) and last year revenue (earnings) divided by lagged MVE. EAR is defined as operating earnings (EBIT). To compare the explanatory power that revenue and earnings have for stock return, a decomposition technique used in Easton (1985) is employed. Total explanatory power (R^2_T) is decomposed into three parts: 1 – the incremental explanatory power of revenues (incremental *REV*); 2 – the incremental explanatory power of earnings (incremental *EAR*); 3 – and the explanatory power common to both revenues and earnings (incremental *COMMON*). The coefficients of determination from equations (2) to (4) are denoted as R^2_T, R^2_{REV} and R^2_{EAR}, respectively. Then $R^2_T - R^2_{EAR} = INCREMENTAL\ REV$ and $R^2_T - R^2_{REV} = INCREMENTAL\ EAR$

in market returns. However, the pooled time-series cross-sectional regressions suffer from a lack of independence in the residuals. This causes substantially understated standard errors or inflated *t*-statistics. To alleviate this problem, the average coefficients are divided by the average standard errors to calculate the *t*-statistics, in accordance with the Fama and Macbeth (1973) approach. The reported results show both *REVLEV* and *EARLEV* lose significance in all specifications while *REVGR* and *EARGR* continue to be statistically significant.

Figure 2 shows the trend in combined and incremental value relevance of revenue and earnings over 1992-2005. For the first four years of the sample period the trend in the incremental revenue R^2 and the combined value relevance R^2 track each other closely. However, from 1996 onwards the incremental earnings R^2 starts to mirror the changes in the combined value relevance R^2.

With respect to the longitudinal changes in the value relevance of revenue, Chandra and Ro (2008) report that while the combined ability of revenue and earnings to summarise contemporaneous value relevant information has remained stable over time, the new information conveyed by earnings has declined whereas the ability of revenue to incrementally convey new information has not diminished. To estimate the longitudinal changes in value relevance of earnings and revenue variables, regression equations (2)-(4) are estimated cross-sectionally each year. Then a series of regression models are estimated (equation 5) using the regression estimates from these equations:

$$EST_{jy} = \zeta_{0j} + \zeta_{1j} YEAR_{jy} + e_{jy,} \quad j = 1, 2, \ldots, 9 \tag{5}$$

where *j* denotes a particular parameter from equations (2) to (4). For example, the first parameter is *REVLEV* which is 14 yearly coefficients from 1992 to 2005 from equation (1).

Table V presents longitudinal changes in the value relevance of earnings and revenue information in Australia from 1992 to 2005. When the combined R^2 from regression equation (2) is regressed on the *TIME* variable, the coefficient estimate on *TIME* is -0.0031 implying that the combined ability of earnings and revenue to explain market adjusted return has declined over the sample period but the decline is not

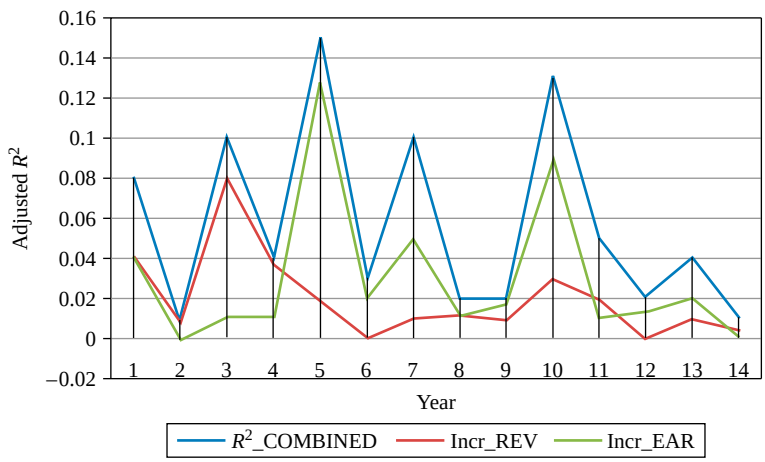

Figure 2.
Trend in the explanatory power of the combined, incremental revenue, and incremental earnings with respect to market-adjusted returns over 1992-2005

Measures	Intercept		Coefficient		Adjusted R^2
Adjusted R^2 *_Eq(2)* (γ_7)	0.08*	[4.00]	−0.0031	[−1.51]	0.003
INCR_ REV R^2 (γ_8)	0.04*	[3.99]	−0.0027*	[−3.09]	0.21
INCR_ EAR R^2 (γ_9)	0.04***	[1.93]	−0.0010	[−0.56]	−0.07
REVLEV (γ_1)	0.02	[1.62]	−0.0014	[−1.35]	−0.0053
REVGR (γ_2)	0.13*	[2.91]	−0.0054	[−1.35]	0.02
EARLEV (γ_3)	−0.26	[−2.02]	0.033*	[3.12]	0.10
EARGR(γ_4)	0.67**	[2.19]	−0.04	[−1.44]	0.08
REVLEV + REVGR (γ_5)	0.15*	[3.65]	−0.0067***	[−1.90]	0.08
EARLEV + EARGR (γ_6)	0.41	[1.34]	−0.0054	[−0.20]	−0.08

Notes: Significance at: *1, **5, and ***10 per cent levels, respectively; coefficients γ_1 to γ_6 are derived from equation (2) and regressed on TIME which takes a value of 1 for 1992, 2 for 1993 and so on to 2005. Coefficient γ_7 is the adjusted R^2 from equation (2) regressed on TIME. Coefficients are derived from a decomposition technique used in Easton (1985). Total explanatory power (R^2_T) is decomposed into three parts: 1 – the incremental explanatory power of revenues (incremental *REV*); 2 – the incremental explanatory power of earnings (incremental *EAR*); and 3 – the explanatory power common to both revenues and earnings (incremental *COMMON*). The coefficients of determination from equations (2) to (4) are denoted as R^2_T, R^2_{REV}, and R^2_{EAR}, respectively. Then $R^2_T - R^2_{EAR}$ = *INCREMENTAL REV* and $R^2_T - R^2_{REV}$ = *INCREMENTAL EAR*. To estimate the longitudinal changes in value relevance of earnings and revenue variables, regression equations (2)–(4) are estimated cross-sectionally each year. Then a series of regression models are estimated using the regression estimates from these equations:

$$EST_{jy} = \zeta_{oj} + \zeta_{1j} YEAR_{jy} + e_{jy}, \quad j = 1, 2, \ldots, 9 \tag{5}$$

where j denotes a particular parameter from equations (2) to (4). For example, the first parameter is *REVLEV* which is 14 yearly coefficients from 1992 to 2005 from equation (1)

Table V.
Longitudinal changes in the value relevance of revenue and earnings

statistically significant (t-statistic = −1.51). Interestingly, the incremental explanatory power of revenue (*INCREMENTAL REV*) has declined significantly over the sample period (coefficient −0.0027, t-statistic = −3.09, p-value < 0.001), and so has the annual revenue coefficients [(*REVLEV + REVGR*) [coefficient value −0.0067, t-statistic = −1.90, significant at better than the 10 percent level]]. One possible reason for such a finding may relate to the persistence of revenue reported in the income statement. The sample for the current study contains both mature, established firms as well as relatively young firms. Persistence of revenue reported by more mature firms is likely to be higher compared to their younger firm counterparts because of the significant environmental uncertainties faced by the latter group of companies. All regressions reported in Table V are rerun for companies surviving for at least nine of the fourteen sample years. This choice, though arbitrary, provides a sample of relatively established firms. Untabulated results show that when *INCREMENTAL REV* is regressed on *TIME* for this sub-sample, the coefficient on *TIME* still remains negative (−0.0032). However, unlike that of the full sample, it becomes insignificant. Similarly, when annual revenue coefficients [*REVLEV + REVGR*] are regressed on *TIME*, the coefficient on *TIME* is again insignificant though negative in sign. This additional analysis confirms the argument that the decline in revenue reported for Australian companies is primarily due to the inclusion of many young and small companies in the total sample.

4.4 Firm profitability and the value relevance of revenue

Hayn (1995) shows that firms reporting negative earnings have smaller ERCs. She argues that this is because shareholders always have the option to liquidate a firm, and as a result, negative earnings are transitory in nature. She also calls for additional research to examine the role of alternative accounting information in equity valuation when companies report negative earnings. Subsequent research has demonstrated that when earnings are negative and firms face financial distress, investors place more weight on book value than on earnings (Barth *et al.*, 1998; Collins *et al.*, 1999; Burgstahler and Dichev, 1997). However, the role of revenue in the context of firm profitability has recently become the subject of academic scrutiny (Ghosh *et al.*, 2005; Chandra and Ro, 2008) but remains unexplored in Australia. This is particularly important given that about 48 percent of the sample observations represent loss firms which are quite substantial, and there has been a steady increase in the number of firms reporting losses over the sample year with the ratio monotonically increasing from 32 percent in 1994 to 56 percent in 2002.

Table VI presents the regression results of equations (2)-(4) for profit and loss sub-samples. For both sub-samples, the combined revenue coefficient is positive and statistically significant although it is marginally higher for loss sub-sample (0.07 versus 0.05). On the other hand, the combined earnings coefficient of the profit sub-sample is significantly higher than that of its loss sub-sample counterparts (1.69 versus 0.03, respectively) consistent with the findings of earlier research. This result, therefore, provides weak evidence of the hypothesis that investors focus more on revenue information in valuing equity when firms report negative earnings.

4.5 Firm life cycle stages and the value relevance of revenue

Firm life cycle is comprised of distinct phases, like introduction, growth, maturity, and decline, and firms progress through these phases as a result of strategic decision-making and competitive environments. Anthony and Ramesh (1992) is one of the first studies in accounting to use the life cycle hypothesis in explaining stock market responses to two accounting performance measures: sales growth and capital investment. Using dividend payout, sales growth and firm size as the proxies for firm life cycle, they find that response coefficients of unexpected sales growth and unexpected capital expenditures decline monotonically from the growth to the stagnant stages. Black (1998) examines the value relevance of earnings and the components of cash flows in each of four life cycle stages: start up, growth, maturity, and decline. Black finds that neither net income nor cash flow from operations (CFO) is value relevant in the start-up phase. CFO becomes a significant explanatory variable in each of the growth, maturity, and decline phase. Net income is significant only in the maturity stage. Dickinson (2007) develops and validates a parsimonious proxy for firm life cycle based on the patterns of a firm's operating, investing and financing cash flows.

This paper adopts the life cycle methodology developed by Dickinson because the other life cycle proxies inherently assume a uniform distribution of life cycle stages (Anthony and Rameh 1992, for example). The combination of cash flow patterns used by Dickinson, on the other hand, "represents the firm's resource allocation and operational capabilities interacted with the firm's choice in strategy". Four life cycle stages based on the firm's operating, investing, and financing cash flows are developed. The introduction stage is characterised by negative operating, negative investing, and positive financing cash flows.

Table VI.
Firm profitability and incremental value relevance of revenue

Variables	Loss firms						Profit firms					
INTERCEPT (α_0)	0.08	(0.62)	0.10	(0.75)	0.09	(0.50)	0.09	(1.53)	0.23*	(3.11)	0.08	(1.29)
REVLEV (α_1)	0.01	(1.57)	0.02***	(1.92)	–		−0.0069	(−1.54)	0.02*	(4.99)	–	
REVGR (α_2)	0.05*	(2.83)	0.04**	(2.35)	–		0.06*	(3.57)	0.09*	(8.01)	–	
EARLEV (α_3)	−0.10**	(−2.45)	–		−0.10*	(−2.63)	1.63*	(10.45)	–		1.68*	(10.93)
EARGR (α_4)	0.13*	(3.67)	–		0.12*	(3.36)	0.06	(0.71)	–		0.05	(0.68)
Adj. R^2	0.10		0.09		0.09		0.17		0.08		0.17	
($\alpha_{1+}\alpha_2$)	0.07*	[2.99]	0.06**	[2.54]	–		0.05*	[3.32]	0.10*	[10.28]	–	
($\alpha_{3+}\alpha_4$)	0.03	[0.75]	–		0.02	[0.35]	1.69*	[10.56]	–		1.73*	[11.53]
Observations	4,003		4,003		4,003		4,327		4,327		4,327	
Year and industry dummies	Included		Included		Included		Included		Included		Included	

Notes: Significance at: *1, **5, and ***10 percent levels, respectively; firms with positive (negative) operating income are profit (loss) firms, respectively. To determine the incremental value relevance of revenue information *vis-à-vis* earnings, the following three regression equations are estimated:

$$RETURN_{it} = \alpha_0 + \alpha_1 REVLEV_{it} + \alpha_2 REVGR_{it} + \alpha_3 EARLEV_{it} + \alpha_4 EARGR_{it} + \varepsilon, \quad (2)$$

$$RETURN_{it} = \beta_0 + \beta_1 REVLEV_{it} + \beta_2 REVGR_{it} + \varepsilon, \quad (3)$$

$$RETURN_{it} = \zeta_0 + \zeta_1 EARLEV_{it} + \zeta_2 EARGR_{it} + \varepsilon, \quad (4)$$

where *REVLEV* and *EARLEV* are revenue and earnings levels, respectively, and *REVGR* and *EARGR* are revenue and earnings growth, respectively. Latter two variables are calculates as the difference between current year revenue (earnings) and last year revenue (earnings) divided by lagged MVE. *EAR* is defined as operating earnings *(EBIT)*. To compare the explanatory power that revenue and earnings have for stock return, a decomposition technique used in Easton (1985) is employed. Total explanatory power (R^2_T) is decomposed into three parts: 1 – the incremental explanatory power of revenues (incremental *REV*); 2 – the incremental explanatory power of earnings (incremental *EAR*); and 3 – the explanatory power common to both revenues and earnings (incremental *COMMON*). The coefficients of determination from equations (2) to (4) are denoted as R^2_T, R^2_{REV}, and R^2_{EAR}, respectively. Then $R^2_T - R^2_{EAR} = INCREMENTAL\ REV$ and $R^2_T - R^2_{REV} = INCREMENTAL\ EAR$

The growth phase is characterised by positive operating, negative investing, and positive financing cash flows. The mature stage reflects positive operating, negative investing, and negative financing cash flows. Finally, the decline stage is characterised by negative operating, positive investing, and positive/negative financing cash flows patterns.

The regression results reported in Table VII reveal that combined revenue and earnings coefficients are statistically highly significant only in the growth stage. Firms with significant growth opportunities are likely to have experienced positive unexpected (abnormal) earnings in recent periods which are expected to persist. Additionally, growth stage firms may be associated with positive net present value investment opportunities, and unexpected revenue as well as earnings may be used as a proxy to infer changes in market expectations about such opportunities (Charitou *et al.*, 2001). Firms in the growth stage continue to invest not only in financial and tangible assets, but also in organisational capital which allow a firm to earn temporary monopoly rents. Growth firms, however, are more likely to manipulate reported information for the purpose of avoiding a negative stock price reaction. For example, Skinner and Sloan (2002, p. 299) find that growth firms missing analysts' forecasts by 0.5 percent of the stock price suffer a significantly negative abnormal return of −10 to −15 percent. However, firms in the growth phase need to signal private information to the marketplace, because it is relatively difficult for outsiders to monitor operating performance of such firms owing to the unique nature of the assets these firms possess (intangible-intensive industries). Therefore, managers could judiciously use

Variables	Introduction		Growth		Maturity		Decline	
INTERCEPT (α_0)	0.52*	(2.95)	0.21*	(2.64)	0.07	(1.34)	0.58*	(2.79)
REVLEV (α_1)	−0.11***	(−1.75)	0.00078	(0.09)	0.16*	(3.14)	0.0013	(0.09)
REVGR (α_2)	0.02	(1.03)	0.18*	(4.79)	0.02	(1.03)	0.04	(1.52)
EARLEV (α_3)	−0.04	(−0.83)	0.16	(1.16)	0.49*	(3.44)	0.06	(0.73)
EARGR (α_4)	0.16*	(2.76)	0.34*	(2.82)	0.27*	(2.36)	0.03	(0.61)
Adjusted R^2	0.08		0.13		0.15		0.11	
($\alpha_{2+}\alpha_3$)	−0.09	[−0.50]	0.18*	[4.86]	0.19***	[1.81]	0.043	[1.41]
($\alpha_{4+}\alpha_5$)	0.12***	[1.93]	0.50*	[3.27]	0.76*	[4.47]	0.09	[1.06]
Year and industry dummies	Included		Included		Included		Included	
Observations	2,461		1,692		2,113		848	

Notes: Significance at: *1, **5, and ***10 per cent levels, respectively; the table reports coefficient estimates and *t*-statistics from the following regression equation:

$$RETURN_{it} = \alpha_0 + \alpha_1 REVLEV_{it} + \alpha_2 REVGR_{it} + \alpha_3 EARLEV_{it} + \alpha_4 EARGR_{it} + \varepsilon, \quad (2)$$

Firm life cycle is operationalised following Dickinson (2007) model. She develops four life cycle stages based on the patterns of a firm's operating, investing and financing cash flows. Introduction stage is characterised by negative operating, negative investing, and positive financing cash flows. Growth phase is characterised by positive operating, negative investing, and positive financing cash flows. Mature stage reflects positive operating, negative investing, and negative financing cash flows. Finally, decline stage is characterised by negative operating, positive investing and positive/negative financing cash flows patterns. *REVLEV* and *EARLEV* are revenue and earnings levels, respectively, and *REVGR* and *EARGR* are revenue and earnings growth, respectively, calculated as the difference between current year revenue (earnings) and last year revenue (earnings) divided by lagged MVE. EAR is defined as operating earnings (EBIT)

Table VII.
Firm life cycle stages and incremental value relevance of revenue

the reporting flexibilities offered by the generally accepted accounting principles (GAAP) to increase the value-relevance of accounting information primarily via the use of discretionary accruals (DACCR). Although these competing hypotheses have not been tested in this paper, the sign of the coefficients suggests an efficient use of DACCR by managers of growth firms.

In the introduction stage of the life cycle the combined earnings coefficients are marginally significant while that of revenue is insignificant implying that firms make investments in the introduction phase with the expectation of generating more revenues and earnings in the growth phase. The combined earnings coefficient is highest in the maturity stage (0.76) and this life cycle stage also results in the highest explanatory power for market adjusted returns. Combined revenue coefficient is positive and statistically significant at better than the 1 percent level in both the growth and maturity stages of the firm life cycle (0.18 and 0.19, respectively). Consistent with predictions, none of the earnings and revenue variables is statistically significant in the decline stage. Anthony and Ramesh (1992) report the largest coefficient on the sales growth variable during the growth phase (a coefficient of 0.21), but this monotonically decreases to -0.0022 in the stagnant phase. Overall, evidence clearly suggests differential pricing of earnings and revenue information in different life cycle stages.

4.6 Robustness checks

4.6.1. Test of non-linearity. The main results reported in the study assume a linear association between market returns and the unexpected accounting performance measures. However, prior capital market research has shown that the relationship between unexpected earnings and market returns assumes a non-linear S-shaped pattern (Freeman and Tse, 1992). This is because tails of the unexpected earnings distributions are dominated by transitory earnings which are difficult to forecast and therefore generate lower marginal price response to unexpected earnings shock. To test for the non-linear effect in the association between market return and unexpected performance measures The following regression adapted from Chandra and Ro (2008) is estimated:

$$\begin{aligned} RETURN_{it} = {} & \gamma_0 + \gamma_1 (Performance\ Measure\ j)_{it} \\ & + \gamma_2 (\Delta Performance\ Measure\ j)_{it} \\ & + \gamma_3 (NL\Delta Performance\ Measure\ j)_{it} + \gamma_{4\text{-}14} YRDUM \\ & + \gamma_{15\text{-}32} INDUM + \varepsilon_{it,} \end{aligned} \tag{1a}$$

where $NL\Delta Performance\ Measure\ j$ is the product of $\Delta Performance\ Measure\ j$ and the absolute value of $\Delta Performance\ Measure\ j$. If the association between market return and performance measures is S-shaped then the coefficient γ_3 will be negative. Unreported results indeed find that the coefficients are all negative and statistically significant, with the exception of the OCF variable, confirming the non-linear relationship. To further explore the non-linear association between market returns and unexpected revenue in the presence of unexpected earnings, the following modified non-linear regression is estimated:

$$\begin{aligned} RETURN_{it} = {} & \alpha_0 + \alpha_1 REVLEV_{it} + \alpha_2 REVGR_{it} + \alpha_3 NLREVGR_{it} \\ & + \alpha_4 EARLEV_{it} + \alpha_5 EARGR_{it} + \alpha_6 NLEARGR_{it} \\ & + \alpha_{7\text{-}15} YRDUM + \alpha_{16\text{-}33} INDUM + \varepsilon_{it} \end{aligned} \tag{2a}$$

Again, a non-linear relationship would result in the α_3 and α_6 coefficients being negative. Unreported results find evidence consistent with a non-linear relationship. In particular, the coefficients on α_3 and α_6 are -0.03 and -0.25, respectively, which are statistically significant at better than the 1 percent level.

4.6.2 Alternative return measure. As an alternative market measure to *MKTADJRET*, buy-and-hold annual returns (*BHRET*) are used and the results are almost identical to those previously reported. This is not surprising given that the pair-wise correlation between the two market return measures is 0.98.

5. Concluding remarks

Financial statements provided by corporate managers contain an array of firm performance measures for current and prospective investors to evaluate in investment decision making. Market reaction to different performance line items could be different because of differences in persistence among the measures, as well as differences in firm characteristics that could make one performance measure superior to another. This paper attempts to shed light on the relative superiority of alternative accounting performance measures in Australia. Results reveal that *EBITDA* has the highest explanatory power, followed by *TOTREV* number. With respect to the impact of firm size, this study finds that for small and medium sized firms *TOTREV* has the highest explanatory power, while the corresponding variable for large firms is *OPINC*. Regarding the incremental value relevance of revenue in explaining contemporaneous stock returns, this paper shows that the combined ability of earnings and revenue to explain stock returns has not diminished, but the explanatory power of incremental revenue has significantly declined over the sample period. However, the latter result is primarily driven by young firms. Further analysis reveals that the combined revenue regression coefficients are positive and statistically significant for firms reporting negative earnings, but the combined earnings coefficients are not. For profit making firms, the combined earnings coefficients are much higher than their revenue counterparts. Finally, life cycle analysis shows that both the combined revenue and earnings coefficients are statistically significant only in the growth stage, while both earnings variables are significant in the maturity stage.

The results of this study will be of practical use to prospective investors and accounting regulators. When making equity valuation decisions investors consider firms' fundamentals as reflected in financial statements. However, which line item is more important for equity valuation is an important consideration. Because of differences in persistence among performance measures, investors need to know which of the measures is more strongly associated with investors' beliefs as reflected in stock market returns. A recent comprehensive survey of chief financial officers (CFO) by Graham *et al.* (2005) shows the GAAP earnings number, especially the earnings per share, is the key metric upon which the market focuses. This is mainly because investors need a simple benchmark to evaluate a firm's performance that reduces the costs of information processing due to information overload (Graham *et al.*, 2005, p. 21). However, evidence from this study finds that investors do factor in firm-specific characteristics in weighing alternative performance measures. The finding that there has been no systematic decline in the value relevance of accounting earnings in Australia will enhance the confidence of accounting regulators and corporate stakeholders regarding accounting information quality.

Notes

1. Interestingly, increasing value-relevance of revenue information is reported at a time when the allegations about revenue manipulation are also mounting. Anecdotal evidence shows that a significant proportion of earnings management cases take the form of revenue manipulation. For example, in a recent report by the General Accounting Office (GAO) on financial restatements, revenue recognition-related restatements account for about 37 percent of the 919 restatements announced during 1997-2002 (GAO, 2003). Similarly, Dechow and Schrand (2004) indicate that over 70 percent of the 294 Securities and Exchange Commission Accounting and Auditing Enforcement Releases they examine involve overstated revenue.
2. Research on the value relevance of revenue gained momentum during the dot-com bubble in the late 1990s, when many firms – mainly in the technology sector – earning minimal profits, or incurring losses, had large market valuations based on sales growth. Trueman *et al.* (2000, 2001) find that earnings are unrelated to stock price on average for internet firms, but that both financial and nonfinancial measures of revenue are value relevant. Davis (2002) reports that revenue surprises are positively related to announcement-period abnormal returns for a sample of internet firms.
3. It is important to note that returns and levels specifications do not address the same research question. Returns specification can be used to determine whether independent variables reflect information that over a specific period of time: the returns window; causes investors to change their beliefs and, consequently, prices (i.e. used to capture the timeliness notion of financial reporting). On the other hand, levels specification can be used to determine whether accounting variables reflect information associated with information used to price shares over all periods up to a specific point in time. The research design of this study reflects the timeliness notion of performance measures, and hence uses returns specification. Beaver (2002, pp. 461-2) cautions that changing the form of the variable may fundamentally change the question addressed. He notes:

   > One chooses the levels design when the problem is to determine what accounting numbers are reflected in firm value, whereas one chooses the first difference research design when the problem is to explain changes in value over a specific period of time. Hence, in the first differences formulation, the issue of the timing of information is important.

   Gonedes and Dopuch (1974) argue that returns models are theoretically superior to price models in the absence of well-developed theories of valuation. Lev and Ohlson (1982) describe the two approaches as complementary. Landsman and Magliolo (1988) show that levels models can dominate returns models, for example, when model parameters and omitted variables are not inter-temporally constant.

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Further reading

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