An *Empirical Test* of **Fundamental** Analysis in India

Christopher Luchs, Suneel K. Maheshwari, Mark Myring

ABSTRACT

Fundamental analysis examines the relation between financial statement data and returns. Previous studies show a link between fundamental signals (which include ratios and other financial performance measures) and returns in the US capital markets. This study extends this line of research by examining the relation between fundamental signals and returns in India. Indian accounting standards and capital markets differ significantly from those in the US. Using the methodology developed by Lev and Thiagarajan (1993), we examine the relationship between these financial measures and returns in India. Our results reveal a significant relationship between fundamental signals and returns in India, suggesting that investors in Indian stock markets find fundamental signals relevant in making investment decisions. Comparison of results obtained using Indian data to those studies based in the US provides insight into the differences between the two countries.

Keywords: Fundamental, Signals, Returns

Fundamental **Analysis**

INTRODUCTION

Using data from publically traded firms in India, we examine the relationship between accounting information and firm valuation. A fundamental construct used to determine the quality of accounting disclosures is whether they are useful in making investment decisions. Research both in the US [See Ohlson (2009) for a discussion of the major themes] and abroad [See Dykxhoornand Sinning (2010) for a discussion] provide evidence that accounting information is useful to investors. In addition, studies using data from India similarly provide evidence that earnings are useful to investors. For example, Ghosh (2008) examines the use of debt by Indian firms on corporate profitability. In addition, Sarkar et al. (2008) finds that the composition of the board of directors affects the probability of earnings management in Indian firms. We extend this body of knowledge by examining a broader array of financial statement information to determine if it is relevant to investors.

Specifically, this paper examines the association between fundamental signals and returns. Fundamental signals are key financial statement data believed to be associated with returns. The association between fundamental signals and returns is well established in the US. Ou and Penman (1989) conducted a statistical search for fundamental signals. Later, Lev and Thiagarajan (1993) examined the information

used by security analysts to refine the set of fundamental signals. This resulted in a set of twelve signals that are thought to be value-drivers of firms. Incorporating the fundamental signals in market-based accounting models shows an increase the explanatory power of these models. Abarbanell and Bushee (1997), Abarbanell and Bushee (1998) and other studies use the framework developed by Lev and Thiagarajan (1993).

We obtained data for 291 Indian firms. Given both data limitation of the Global Vantage database and Indian accounting rules we are able to construct only five of the twelve signals from Lev and Thiagarajan (1993). We then regress the fundamental signals on returns. The results show support for the statistical relevance of fundamental signals in India. Specifically, the inventory, accounts receivable, R&D, and effective tax rate signals are significantly associated with returns.

The remainder of the paper is organized as follows. Section 2 provides a discussion of the prior literature concerning fundamental signals. Section 3 describes the research design. Section 4 reports the results from regression analysis. Section 5 compares the results of our study to those of Lev and Thiagarajan (1993). Section 6 summarizes this paper.

ITERATURE REVIEW

Many studies have examined the association of accounting information and returns since the pioneering work of Ball and Brown (1968) and Ball and Watts (1972). Studies like Easton et al. (1992) and Lipe and Freeman (1986) specifically examined the information contained in earnings. Later studies like Ou (1990), Mahehwari et al. (2003) and Riley et al. (2003) examined the information content of non-earnings financial data. Interest in fundamental signals was advanced by Ou and Penman (1989) and Holthausen and Larcker (1992). Both of these studies relied on a statistical search to identify 'signals' associated with firm value. Ou and Penman (1989) examined the ability of 68 financial signals to predict the sign on the change of earnings. The authors screened the signals one-by-one, dropping variables with coefficients that do not have a significant relationship with future earnings. As a result of this process, 34 variables were identified that potentially have a significant relationship with earnings changes. Next, the authors load these variables using a step-wise regression technique and find that 18 variables bear a significant relation with earnings changes. Many of these variables are also found be significantly related to future stock returns.

Holthausen and Larcker (1992) incorporated the 68 signals from the Ou and Penman (1989) study into their analysis of the variables ability to predict the sign of the following year excess returns. This method provides an additional test of the information content of the signals. The authors created a trading strategy based on the association of the signals and the direction of year ahead excess returns. The results suggest that it is possible to earn abnormal returns based on this trading strategy. Their study provides additional evidence that the information contained in the signals is value relevant.

Lev and Thiagarajan (1993) furthered our understanding of fundamental signals by evaluating the information used by analysts instead of relying on an extensive list of signals as the previous studies had done. This examination identified the following fundamental signals concerning inventories, accounts receivable, capital expenditures, research and development (R&D), gross margin, selling and administrative expenses, provision for doubtful receivables, effective tax rate, order backlog, labor force, LIFO earnings and audit qualification. The authors then regressed the twelve signals and the change in pretax earnings adjusted for the effective tax rate on the 12 month excess stock returns. The first set of analyses examined the relation between returns and the fundamental signals for firms in which all signals were available. This was a significantly smaller sample due to the lack of reporting of the order backlog signal by the majority of the firms. The results indicated that the inventory, accounts receivable, capital expenditures, gross margin, selling and administration expenses, and order backlog signals are associated with the dependent variable of excess stock returns. The second set of analyses involved regressing returns on only nine of the signals. The R&D, provision for doubtful receivables and the order backlog signals were dropped from the analyses. This action results in a much larger sample as three signals were not available for many of the firms. The results from the reduced model show that the inventory, accounts receivable, capital expenditures, gross margin, selling and administration expense, effective tax rate and the labor force signals provide additional explanatory power. Taken together, both analyses showed support for the authors' contention of the importance of the signals.

Aggarwal and Gupta (2009) examined the market performance of high book-to-market stocks in India using fundamental signals. The authors selected the top 20% of firms, according to the book-to-market ratios, in India that had data available during 2003-2007. The authors constructed an F_Score which captured the firm's financial performance utilizing financial statement data concerning profitability, leverage, liquidity, and operating efficiency. Specifically, the signals examined include: ROA, cash flows from operations, change in ROA, accruals, change in amount of long-term debt to total assets, change in current ratio, current equity offering, change in gross margin, and finally change in asset turnover ratio. Each signal is individually scored as either good (1) or bad (0). An F_Score of 0 would represent a firm where all of the nine signals were coded as bad. A majority of the firms had F_Scores between 3 and 7, suggesting mixed signals. The authors randomly selected 20 stocks from each of the low, mid, and high F-Scores for the final sample. The performance of a buy and hold strategy for all three portfolio were compared to market and risk-adjusted returns. The portfolio of the high F_Scores firms exceeds both the market and risk-adjusted returns, suggesting that fundamental analysis contained value relevant data.

We add to this stream of literature by providing a comprehensive examination of the relation between fundamental signals and returns using Indian data. This study differs from the Aggarwal and Gupta (2009) in several important ways. First, the sample used in their analysis includes only high book-to-market firms while our sample includes firms with a broad range of characteristics. Second, we use a set of fundamental signals that is consistent with those commonly used in research of U.S. markets. This approach allows for a comparison between two capital markets.

ETHODOLOGY

The sample for this study was drawn from the Global Vantage database. Data was obtained for 291 firms incorporated in India, yielding 594 observations. Due to certain data limitations and accounting rules, not all twelve signals used by Lev and Thiagarajan (1993) could be constructed. For example, the LIFO Earnings signal was dropped from the analysis since Indian GAAP does not permit other inventory valuation methods. Data was available for five of the twelve signals. The signals available for this study are: inventory, accounts receivable, R&D, auditor qualification, and effective tax rate. Table 1 provides a short description of each of the fundamental signal used in this study.

Table 1
Fundamental Signals

Inventory	An disproportionate increases in inventory in relation to an increase in sales suggest that the firm may have difficulty in generating sales.
Accounts Receivable	A large increase in accounts receivable without the offsetting increase in sales can suggest to analysts that the firm may be experiencing trouble in selling their products. Analysts view the disproportionate increase in accounts receivable signaling the firm having to resort to offering credit extensions to generate sales.
Research and Development (R&D)	A decrease in the relative level of R&D is interpreted as negative news.
Audit Qualification	When an auditor issues an adverse, qualified or disclaimed audit opinion negative news is perceived by analysts.
Effective Tax Rate	Given the transitory nature of the firms' effective tax rate as extraordinary decrease in the effective tax rate is considered as a negative signal concerning earnings persistence.

In order to empirically test the incremental value of the five fundamental signals over earnings, a base model must be established. The base model involves regressing the annual change in EPS on returns.

The conventional returns-earnings regression:

$$R_{it} = \alpha + \beta \Delta EPS_{it} + \varepsilon_{it}; \qquad (1)$$

Where:

R_{it} = 12 month return for the current fiscal year.

ΔEPS_{it} = The annual change in EPS (primary, excluding extraordinary items), deflated by beginning-of-year share price.

e_{it} = Error term from regression analysis

i = 1, 2, 3,..., n, number of firms

The next model incorporates the five fundamental signals:

$$R_{it} = \alpha + \beta_0 \Delta PTEPS_{it} + \beta_1 INV_{it} + \beta_2 AR_{it} + \beta_3 RD_{it} + \beta_4 AO_{it} + \beta_5 EffTax_{it} + e_{it} \qquad (2)$$

Where:

R_{it} = 12 month return for the current fiscal year.

$\Delta PTEPS_{it}$ = The annual change in Pretax EPS (primary, excluding extraordinary items), deflated by beginning-of-year share price.

INV_{it} = Inventory measured as $(\Delta Inventory) - (\Delta Sales)$ The Inventory variable used is 'Finished Goods' when available, and 'Total Inventory' otherwise.

AR_{it} = Accounts Receivable measured as $(\Delta AR) - (\Delta Sales)$

$R\&D_{it}$ = Change in firm-specific R&D

AO_{it} = Auditor Qualification, 1 for Qualified, 0 for Unqualified

$EffTax_{it}$ = $PTE_{it}(T_{ti-1} - T_{it})$, PTE_t = pretax earnings at time t, deflated by beginning price

T_{it} = Effective tax rate

e_{it} = Error term from regression analysis

i = 1, 2, 3,..., n, number of firms

Comparing the results of the two models allows for the examination of the information content of the individual signals. Significance of a particular coefficient indicates an association of that signal and annual returns. Also included in the model are fixed year effects to control for the effect of time period specific conditions. To control for bias of extreme observations the data was winsorized at 5%. The process realigns the data below the 5th percentile and above the 95th percentile to the 5th and 95th percentiles, respectively.

RESULTS

Table 2 presents the pearsoncorrelation matrix. As expected, returns are positively correlated with both current change in earnings and current pretax change in earnings. Returns are also positively correlated with inventory, R&D, auditor qualification, and effective tax rate fundamental signals. The coefficient for the accounts receivable signal is negatively correlated with returns.None of the correlations between independent variables are high enough to suggest a problem with multicollinearity. Further, we compute variance inflation factors in regression analysis to test formulticollinearity. The results of this analysis provide no evidence of a multicollinearity problem.

Table 2
Correlations

	RET	CEPS	CEPS PT	INV	AR	RD	AO	Efftax
RET	•	0.328	0.139	0.022	-0.0716	0.098	0.006	0.008
CEPS		•	0.328	-0.029	-0.099	0.065	-0.006	-0.002
CEPS_PT			•	-0.025	-0.068	0.052	0.014	-0.257
INV				•	0.044	-0.043	0.09	0.001
AR					•	-0.022	0.025	0.04
RD						•	0.062	0.011
AO							•	0.016
EffTax								•

Column 2 of Table 3 provides the results from regressing the current change of EPS on returns. The adjusted R^2 is 0.2765, indicating considerable explanatory power for the earnings-returns model. The coefficient on change of EPS is significant at p<0.01, indicating a positive relationship between the

change in current EPS and contemporaneous returns in India. This result suggests that accounting information is incorporated in stock prices and is relevant to investors in India.

Column 3 of Table 3 shows the results of the regression of returns on change in earnings and fundamental signals. The f-statistic on the regression is 13.92 (significant at p<0.01) which suggests the model has considerable ability to explain returns. The coefficient on change in EPS is significant at p<0.01, suggesting that there is a significant relation between earnings and returns. Coefficients on four of the five fundamental signals (inventory, accounts receivable, R&D, and effective tax rate) are significant suggesting that these signals have a significant association with returns.

The coefficient for the inventory variable is negative. The negative coefficient is expected since this variable is constructed to capture a disproportionate change in inventory with respect to sales. The negative coefficient for the accounts receivables suggests that adisproportionate increase in accounts receivables with respect to sales is viewed negatively by market participants. The coefficient for the R&D variable is positive and significant. This variable is constructed as the firm-specific change in R&D. Given its significance, there seems to be a positive association between returns and the amount of R&D.The coefficient for the effective tax rate signal is significant and positive. This result suggests a positive association between a change in a firm's effective tax rate and contemporaneous returns. The positive coefficient for the effective tax rate signal was not expected since Lev and Thiagarajan theorize that a reduction in a firm's effective tax rate would be a negative signal to the market. However, this result from our study suggests a reduction in the firm's effective tax rate is positively associated with contemporaneous returns. The significance for these variables suggests that they possess additional explanatory power of returns over that of earnings. According to the results, the auditor opinion signal does not add significantly to the explanatory power of the model. Taken together there is evidence the fundamental signals provide additional information that is value relevant in the Indian capital market.

As a robustness check, we re-estimate the model using stepwise regression (not reported in tables). As expected, the change in EPS variable and the four significant fundamental signals load in this analysis. Thus, the results from this alternative estimation procedure confirm our results reported in the tables.

Variable	Coefficients
INV	-0.0208 (-1.65)*
AR	-0.123 -(1.83)*
RD	0.07 (2.12)**
AO	-0.009 -0.16
EffTax	0.001 (2.47)**
R-square	0.2765 0.2334
f-value	26.22 13.92
Fixed Year Effects Included	Yes Yes

*** Significant at the 1% level, ** significant at the 5% level, *significant at the 10% level.

Comparison of Results of the Lev and Thiagarajan US Sample and the Indian Sample

Comparison of the results of this study and the results of Lev and Thiagarajan (1993) study allows for not only an examination of the role of individual signals but also for analysis of the capital markets. Table 4 presents the significant signals from both the Lev and Thiagarajan (1993) study and this study. This comparison is limited only to the five fundamental signals present in both studies. The coefficient for the inventory variable in the US sample [Lev and Thiagarajan (1993)] is significant and negative. This is consistent with our results, suggesting that market participants in both countries interpret the information contained in the signal in a similar fashion and both capital market participants view a disproportionate increase of inventory with respect to sales as negative news. The coefficient for the accounts receivable signal is significant and negative in both studies. This signal is designed to capture the market's reaction to a disproportionate increase in receivables with respect to sales, suggesting that in both capital markets returns are associated with a disproportionate increase in accounts receivable. The R&D variable in the Lev and Thiagarajan (1993) study is not significant, indicating no discernable relationship between returns and this particular signal. In contrast, the R&D signal is significant in our study. The coefficient for the R&D variable is positive suggesting that investors view an increase in R&D expenditures as a positive signal.

Table 3
Contemporaneous Returns on EPS and Fundamental Signals

Variable	Coefficients	
Intercept	0.630 (7.53)***	0.643 (7.19)***
Current Change EPS	1.783 (7.82)***	
Current Pretax EPS		0.002 (3.48)***

Table 4
Comparison of Results

	US Sample	India Sample
INV	Significant	Significant
AR	Significant	Significant
RD		Significant
AO		
EffTax		Significant

In both the Lev and Thiagarajan (1993) found in their study that the audit qualification signal is not significant. In both capital markets, participants do not incorporate a qualified, disclaimed, or even an adverse opinion from the audit firm as negative news that is reflected in their expectation for the firm. The coefficient for the effective tax rate signal is significant in our study. Thus, it appears that market participants in India view the information in the effective tax rate signal as value relevant. The coefficient for the effective tax rate signal in the Lev andThiagarajan (1993) study is not significant.

CONCLUSION

Our study of fundamental signals in India is derived from the Lev and Thiagarajan (1993) study. The purpose of this study is to examine fundamental signals that researchers have posited to capture value relevant information of a firm in the US capital market and test whether these signals have similar properties in the Indian capital market. This stream of research of fundamental signals started with Ou and Penman (1989) who used 68 common financial ratios as signals and examined their merits within the context of a trading strategy. After eliminating insignificant variables, the authors were able to identify some of the variables as value relevant. Holthausen and Larcker (1992) provide an extension to Ou and Penman (1989) by examining the predictive ability of 68 financial ratios.

Lev and Thiagarajan (1993) chose a different approach towards analysis of fundamental signals. Their approach was to identify a set of signals from the financial press. This process gave the authors a set of 12 signals that have been purported to be used by analysts. This approach is markedly different than the previous studies, in which, the authors included 60 or more possible signals. The results of analysis based on the full sample from the Lev andThiagarajan (1993) study indicated that the inventory, accounts receivable, capital expenditures, gross margin, selling and administration expense, and order backlog signals are value relevant.

Our study of the Indian capital market follows the second approach in that we use the refined set of signals created by Lev andThiagarajan (1993). However, given the data limitation of the Global Vantage database we were only able to create five of the signals. These five signals include inventory, accounts receivable, R&D, audit opinion, and effective tax rate. The results of our analysis reveal that inventory, accounts receivable, R&D, and effective tax rate signals are value relevant. These results suggest that investors incorporate the information contained in these signals in their investment decisions. In addition to an examination of the signals in the Indian capital market, we can compare the US and India capital markets given the results of both Lev and Thiagarajan (1993) study and our study. The results suggest that market participants in both capital markets incorporate the information in the inventory and accounts receivable signals in a similar fashion. Results for the audit opinion signal are similar in both studies. The coefficients for this signal are insignificant and appear to be ignored by investors in both countries. Differences in the results of the two studies appear in the analysis of the R&D and effective tax rate signals. The information contained in the R&D and effective tax rate signals are associated with the behavior of investors India but not with those in the US. These results highlight potential differences in the two capital markets and serves as a viable avenue of future research.

REFERENCES

1   Abarbanell, JS, and BJ Bushee (1997). "Fundamental Analysis, Future Earnings, and Stock Prices", Journal of Accounting Research, 35(1), PP. 1-24.

2   Abarbanell, JS, and BJ Bushee (1998). "Abnormal Returns to a Fundamental Analysis Strategy", The Accounting Review, 73(1), PP. 19-45.

3   Aggarwal, N, and M. Gupta (2009). "Do High Book-to-Market Stocks Offer Returns to Fundamental Analysis in India?", Decision 36(2), PP. 155-175.

4   Ball, R, and P Brown (1968). "An Empirical Evaluation of Accounting Income Numbers", Journal of Accounting Research, 6(2), PP. 159-178.

5   Ball, R, and R Watts (1972). "Some Time Series Properties of Accounting Income", Journal of Finance, 27(3), PP. 663-681.

6   Dykxhoorn, HJ, and KE Sinning (2010). "A Review and Analysis of International Accounting Research in JIAAT: 2002-2010", 19(2), PP. 137-153.

7   Easton, P, T Harris, and J Ohlson (1992). "Aggregate accounting earnings can explain most of security returns", Journal of Accounting & Economics, 15(2/3), PP. 119-142.

8   Ghosh, S (2008). "Leverage, Foreign Borrowing and Corporate Performance: Firm-Level Evidence for India", Applied Economics Letters, 15(8), PP. 607-616.

9   Holthausen, RW, and DF Larcker (1992). "The Prediction of Stock Returns Using Financial Statement Information", Journal of Accounting and Economics, 15, PP. 373-411.

10   Lev, B, and SR Thiagarajan (1993). "Fundamental Information Analysis", Journal of Accounting Research, 31(2), PP. 190-215.

11   Lipe, RC, and RN Freeman. (1986). "The information contained in the components of earnings/discussion", Journal of Accounting Research, 24, PP. 37-68.

12   Mahehwari, S, A Krishnamoorthy, W Berry and J Stone (2003). "Lack of Timeliness in Reported Earnings and Fundamental Financial Statement Analysis", Delhi Business Review, 4(2), July-December, 2003.

13   Ohlson, JA (2009). "Accounting Data and Value: The Basic Results", Contemporary Accounting Research, 26(1), PP. 231-259.

14   Ou, JA (1990). "The Information Content of Nonearnings Accounting Numbers as Earnings Predictors", Journal of Accounting Research, 28(1), 144-163.

15   Ou, JA, and SH Penman (1989). "Financial Statement Analysis and the Prediction of Stock Returns", Journal of Accounting and Economics, 11. PP. 295-329.

16   Riley, RA, TA Pearson, and G Trompeter (2003). "The value relevance of non-financial performance variables and accounting information: the case of the airline industry", Journal of Accounting & Public Policy, 22(3), 231-254.

17   Sarkar, J, S Sarkar, and K Sen (2008). "Board of Directors and Opportunistic Earnings Management: Evidence from India", Journal of Accounting, Auditing & Finance, 23(4) PP. 517-551.