Do Analyst Practices and Broker Resources Affect Target Price Accuracy?
An Empirical Study on Sell Side Research in an Emerging Market

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Abstract

This paper attempts to measure the impact of non-financial factors including analyst practices and broker resources on performance of sell side research. Results reveal that these non-financial factors have a measurable impact on performance of target price forecasts. Number of pages written by an analyst (surrogate for analyst practice) is significantly and directly linked with target price accuracy indicating a more elaborate analyst produces better target price forecasts. Analyst compensation (surrogate for broker resource) is significantly and inversely linked with target price accuracy. Out performance by analysts working with lower paying firms is possibly associated with motivation to migrate to higher paying broking firms. The study finds that employing more number of analysts per research report has no significant impact on target price accuracy –negative co-efficient indicates that team work may not result in better target price forecasts. Though insignificant, long term forecast horizon negatively affects target price accuracy while stock volatility improves target price accuracy.

Keywords: equity research, target price accuracy, broker resources, analyst practices

JEL Classification: G24, G15, G12

1. Introduction

Sell side research plays a central role in dissemination of information to investors in equity capital markets. Over the past few decades, academic literature has consistently focused on determining if equity research has investment value. Some studies (Elton, Gruber, & Grossman, 1986; Stickel, 1995; Womack, 1996; Barber, Lehavy, McNichols, & Trueman, 2001; Li, 2005; Asquith, Mikahil, & Au, 2005) find merit in equity research while others (Easterwood & Nutt, 1999; Jackson, 2005; Cheng, Liu & Qian, 2006; Bonini, Zanetti, Bianchini, & Salvi, 2010) have their reservations on the usefulness of equity research. Moving away from this debate, this paper plans to investigate if non-financial factors such as analyst practices and broker resources have any relationship with the target price forecasts. By doing so, the study attempts to provide a different perspective towards non-financial factors affecting target price forecasts.

Abhayawansa and Abeysekera (2009) propose that a study needs to be conducted on practices being followed by sell side analysts to better understand how information for research reports is being processed. In this regard, Xie and Luo (2012) state that the decision making process of an individual is affected by various psychological factors such as decision style and personality traits. They further state that it becomes important to study these identifiable personal attributes of research analysts to better understand analyst decision making process. It is logical to think that personal attributes and thinking process of an analyst reflects in the practices adapted. For example, some analysts apply more weight age to current financial data while others prefer to base their analysis on expected future performance of the company. One major objective of this study is to investigate the impact of such differences on analyst performance.

Womack (1996) explains that brokerages spend time and investment in collecting, analyzing and publishing recommendations in equity research reports. He estimates that millions of dollars are spent by brokerage houses on preparing research reports and according to him processing information can be a costly task. An extension to Womack's (1996) research could be investigation if spending more time and using more resources produces better results. Another objective of this study is to

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measure the impact of broker resources on analyst accuracy.

Past studies (Clement, 1999; Hong, Kubik, & Solomon, 2000; Frankel, Kothari, & Weber, 2006; Abhayawansa & Abeysekera, 2009; Feldman, Gilson, & Villagonga, 2010) have investigated the impact of non-financial factors such as information content, number of analysts employed, intellectual capital disclosure and number of pages on analyst performance in developed markets. This research continues their work and investigates the impact of analyst practices and broker resources on analyst performance in an emerging market environment. Emerging markets have lesser transparency and more volatility (Chan & Hameed, 2006) and a study on the impact of non-financial factors on analyst performance can throw light on differential forecasting abilities of analysts in such a dynamic environment.

An important aspect of this study is to link up non-financial aspects with a measurable output. Asquith, Mikhail and Au (2005) state that academic literature on equity research is divided into three parts - market impact of stock recommendation on stock price, earnings forecast and target price accuracy. Kerl (2011) claims that most past research has focussed on the first two parts and literature has recently shifted to target price accuracy. This study has the objective of adding new evidence to existing knowledge base on target price accuracy. Kerl (2011), Bradshaw, Brown and Huang (2012) and Bilinski, Lyssimachou and Walker (2012) are three recent studies on target price accuracy.

Literature review suggests that this paper is possibly the first attempt to link up target prices with analyst practices and broker resources in an emerging market set up. The target end users of this study are primarily research departments of issuing brokers and global investment banks. For investors, this research provides insights into the type of research reports which tend to be more accurate with their target price forecasts.

The paper is divided in five sections. This section has introduced the subject, the second section deals with literature on the subject, the third presents the research methodology, the fourth section reports the research findings and the fifth section works towards the conclusion.

2. Literature Review

Previts, Bricker, Robinson and Young (1994) examine 479 analyst reports and find that equity research reports contain rich content with respect to industry and economic analysis and they observe that analysts extensively use non financial information in their research reports in justify their forecasts. A few years later, Rogers and Grant (1997) have performed a similar analysis on the content of equity research reports. Breton and Taffler

(2001) report that non financial information including firm's management and strategy form an important part of analyst research reports beside the financial information and analysts make their investment recommendations by taking a holistic view of the internal as well as external environment of the company. These studies reveal that non financial information is an integral part of equity research reports and it is logical to expect that non-financial information in a research report may have a measurable impact of analyst performance. It can be inferred that analysts differently use financial and nonfinancial information in their decision making process and investigation into this aspect can provide insights into differential forecasting abilities of analysts.

Barber, Lehavy and Trueman (2000) state that buy recommendations of the largest brokerage houses outperform buy recommendations of smaller brokerage houses. This suggests that resource availability with analysts has a measurable impact on analyst performance. On similar lines, Youssef and Rajhi (2010) find evidence that analysts working for larger broking house produce more accurate forecasts for French companies. These studies suggest that analyst accuracy is linked to availability of resources in developed markets and investigation needs to be done if this is the case in emerging markets. It is quite possible that analysts with smaller local brokers outperform analysts with global brokers on the basis of local information advantage.

Asquith, Mikhail and Au (2005) find that the preferred form of output for equity investors is target price forecasts as compared to earnings forecasts. They feel that investors stand to benefit from making investment decisions based on the accuracy of these target price forecasts. Considering the importance of target price forecasts to investors, it is surprising that target price forecasts remain an under researched area (Bradshaw, Brown, & Huang, 2012).

Literature provides an interesting backdrop for investigation into the impact of analyst practices and broker resources on target price accuracy. How would analyst practices and broker resources affect target price accuracy in a volatile emerging environment? Is detailed analysis needed in a volatile emerging market? Does the speculative nature of emerging markets

Clement (1999) has conducted related research with focus on understanding the differential forecasting abilities of analysts. He states that analyst skill and availability of resources are positively linked with forecast accuracy. More recently, Xie and Luo (2012) measure the impact of unidentifiable individual differences among analysts on the cross section of their earnings forecast accuracy and find that unidentifiable analyst specific effects can affect earnings forecast accuracy. They state that analysts experience with the firm, intensity of firm following and forecast horizon are closely related with earnings forecast accuracy.

This research follows Clement (1999) and Xie and Luo (2012) from an emerging market perspective. It is expected that ana-

lysts in developed markets spend more time analyzing stocks in a less volatile, more predictable environment. Further, brokers may choose to invest lesser resources in an emerging market set up. With these assumptions, it is possible to assume that analyst practices and application of broker resources vary in emerging markets.

With respect to methodology, this research differs from Clement (1999) and Xie and Luo (2012) on three counts. First, this paper uses input variables which are different than the ones used in these two studies. Second, this paper has narrowed down on target price accuracy as a measure of forecast accuracy whereas Clement (1999) and Xie and Luo (2012) used earnings forecast accuracy. Third, Clement (1999) and Xie and Luo (2102) have an objective of understanding differential forecasting abilities of analysts while this research focuses on understanding the impact of analyst practices and broker resources on target price accuracy with the intention of improving target price accuracy.

3. Research Methodology

3.1. Calculating Target Price Accuracy

Target price accuracy measures if investor made profit from target price forecasts anytime during the forecast horizon of 12 months. In this study, it is assumed that investors exit their position as soon as the target price has been achieved. The following conditions are set for calculating TPA for buy ratings:

TPA forecast is accurate

(The highest price achieved in (t+364) days) = or > (target price recommended by analyst),

TPA forecast is inaccurate

(The highest price achieved in (t+364) days) < (target price recommended by analyst)

For sell ratings provided by analysts, the conditions are reversed.

TPA forecast is accurate

(The lowest price achieved in (t+364) days) = or < (target price recommended by analyst)

TPA forecast is inaccurate

(The lowest price achieved in (t+364) days) > (target price recommended by analyst)

TPA is dichotomous or binary in nature making the dependent variable a dummy variable.

3.2. Choice of Model Used for Estimation of Impact of Inputs on TPA

For binary dependent variables, ordinary least squares (OLS) regression may not be the best method. Gujarati (2011) states that binary response regression models can be estimated by the logit or probit models and our study uses logit regression.

3.3. Independent Variables: Analyst Practices and Availability of Resources

3.3.1. Number of Pages in a Research Report

De Franco, Hope, Vyas and Zhou (2011) claim that majority of research in the past has focused on outputs of sell side financial analysts whereas there is limited research on the written disclosures by analysts. They measure the readability of research reports through number of words and number of characters in a research report. They state that high ability analysts produce more readable reports.

Nielsen (2008) finds that an average analyst report has 7.1 pages. He finds that recurrent information in analyst research reports is concerned with evaluating information provided by a firm and new information is avoided by analysts in recurrent reports. However, his research focuses primarily on the information within research reports and there is no link up with the output of research reports.

A more related research on number of pages has been conducted by Feldman, Gilson and Villalonga (2010). They investigate the information content and forecast accuracy of 1,793 analyst research reports around 62 spinoffs. They use number of pages as a proxy for amount of attention analysts devote to companies in their reports. They find that an average analyst report is 5.7 pages long and on an average 3.3 pages are devoted to analyzing the parent rather than the subsidiary in a spinoff. Their findings indicate that analysts are more accurate with forecasts on parent company rather than subsidiary as analysts devoted more time to parent companies. They conclude that analysts who devote more attention to detail and write more pages, eventually end up with better forecasts. This study uses number of pages written as a proxy for the amount of attention to detail and investigates if the relationship between number of pages and target price accuracy is positive.

3.3.2. Forecast Horizon or Number of Years of Forecasts Used by Analyst

Sharpe (2005) is of the opinion that three to five years of forecasts by analysts is probably the most widely cited horizon period. He reports that equities with long term growth forecasts

by analysts tend to have sub standard performance. His research finds that long term growth forecasts are upward biased and extreme, thereby creating an impression that long term forecasts may have a negative influence on stock performance.

The negative association with stock performance of long term forecasts is further confirmed by Easton and Monahan (2005). They contend that expected returns forecasts can be highly unreliable if the stock returns are based on long term earnings forecasts of analysts. Damodaran (2009) states that there is little evidence which suggests that analysts stand to make better forecast when they make forecasts of more than three and five years. He contends that superiority in forecasting ability of an analyst is inversely linked with long term forecasts. This study uses number of years of forecasts as a proxy for forecast horizon. The expected relationship between forecast horizon and target price accuracy is negative as suggested by Sharpe (2005), Easton and Monahan (2005) and Damodaran (2009).

3.3.3. Number of Analysts per Research Report

Frankel, Kothari and Weber (2006) discuss that past research typically regards the number of analysts following a firm as a good proxy for information about a firm. In their research, they find that number of analysts following a firm does not significantly impact informativeness. In a similar study, Hong, Kubik and Solomon (2000) used number of analysts submitting forecasts as a proxy for number of analysts working for a brokerage firm in their study. They state in their research that prestigious brokerage firms hire more analysts.

The focus on number of analysts is strengthened by propositions made by Xie and Luo (2012). They claim that brokerage houses and independent research firms are following a trend of using analysts in teams, with a senior leader guiding the team. They find that this trend is becoming very popular in the financial research industry. This study measures the impact of more number of analysts applied per research report on target price accuracy with an expected positive relationship with the dependent variable.

3.3.4. Compensation Paid to Analyst

Bradshaw and Brown (2006) are unaware of any evidence which establishes a relationship between target prices and analyst compensation. Groysberg, Healy and Maber (2010) also find no evidence in their research that analyst forecast accuracy is related to analyst compensation. The literature provides an avenue to explore the relationship between target price accuracy and analyst compensation. In this regard, Hong and Kubik (2003) state that high status brokerage houses typically pay higher compensation to their analysts. The capacity of global in-

vestment banks to pay higher salary to analysts is used as a proxy for a high compensation analyst (dummy with value of 1). Local brokers have a lesser scale of operations and hence they are expected to pay lower compensation (dummy with value of 0).

3.3.5. Beta of Stock

Beta is an important of measure of systematic risk. Kerl (2011) reports that stock specific risk reduces target price accuracy of analysts. This finding is logical considering that high risk stocks should be tough to predict. Hence, this variable is used in the logit to test if stocks specific risk has a negative impact on target price accuracy.

3.4. Setting up the Logit Regression Equation

The dependent variable is binary (1=TPA achieved, 0= TPA not achieved) and the effect of five variables is measured using logit regression. The logit formula is stated in terms of the probability that TPA = 1, which is referred to as P (TPA). This effectively means that P (TPA) is the probability that the target price is achieved. The probability that TPA is not be achieved is stated as (1-P (TPA)). The regression model predicts the logit, that is, the natural log of the odds of the analyst target price forecast being achieved.

The logit equation (1) is framed as follows:

$$LOG\left(\frac{\text{P(TPA)}}{1-\text{P(TPA)}}\right) = b0 + b1x1 + b2x2 + b3x3 + b4x4 + b5x5$$

(1)

where x1 is number of pages written in a research report, x2 is forecast horizon of the analyst, x3 is number of analysts employed per research report and x4 is analyst compensation and x5 is beta of stock.

3.5. Data and Sample Selection

Data is collected from research reports issued on stocks primarily belonging to NIFTY50 index. This index constitutes of 50 stocks which represent 66.9% of the free float market capitalization of the stocks listed on the National Stock Exchange, India (IISL, 2011). The list of stocks used for this study is provided in Table 1.

<Table 1> List of stocks covered

List of Indian stocks			
Tata Steel	Reliance Industries	Infosys	ICICI Bank
Bharti Airtel	HDFC	HDFC Bank	ITC
Larsen &	Mahindra& Mahindra	ONGC	State Bank of

Toubro			India
Tata Motors	Hindustan Unilever	TCS	Axis Bank
NTPC	Dr. Reddy's	Sun Pharma	Wipro
Hero Motocorp	BHEL	GAIL	Hindalco
Tata Power	Sterlite Industries	Maruti India	Ambuja Cements
CAIRN India	Punjab National Bank	HCL Tech	DLF
Sesa Goa	Reliance Comm.	Aurobindo Pharma	Bharat Forge

Our sample consists of 200 research reports. Hosmer and Lemeshow (2000) propose that the sample size for logit regression should be a minimum of 10 for every independent variable while Fisher and Wiebe (2006) state that a ratio of number of cases to independent variables should preferably be at least 20. In this case, the ratio is 40 cases per independent variable. Research reports issued by foreign brokers including JP Morgan, Goldman Sachs, Macquarie, Credit Suisse, HSBC and local brokers in India including HDFC Securities, ICICI Securities, Emkay, Reliance Money and AnandRathi. A list of brokers whose research reports are studied is provided in Table 2.

<Table 2> List of Brokers

Foreign Brokers List			
ABN AMRO	BNP Paribas	Citigroup	Credit Suisse
Deutsche Bank	Goldman Sachs	HSBC	JP Morgan
Macqurie	Merill Lynch	Morgan Stanley	UBS
Nomura			
Indian Brokers List			
Allegro Capital	Ambit Capital	AnandRathi	Angel
Asit C. Mehta	Bajaj Capital	BP Equities	BRICS
Edelweiss	Elara Capital	Emkay	Enam
Firstcall Sec.	ICICI Securities	India Infoline	Karvy
KhandwalaSec.	Kotak	KR Choksey	LKP
MotilalOswal	Nirmal Bang	PINC Research	PrabhudasLilladher
Reliance Money	Religare	Shah Investors	ULJK

4. Results

4.1. Statistical Findings

Analysts meet their target price forecasts with 54.5% accuracy for buy and sell recommendations. On an average, an an-

alyst writes 7.6 pages in a research report with a standard deviation of 7.15. This finding is similar to estimates provided by Nielsen (2008) in Denmark where an analyst writes 7.1 pages on average with a standard deviation of 10.2. Analyst typically has a forecast horizon of 2.25 years and a brokerage house typically employs 1.8 analysts per research report. This implies that research reports are of similar length in emerging or developed markets.

Classification table values indicate that the overall percentage is 61.2% after introducing the variables. This is an improvement from the previously stated 54.5%. Table 3 provides data related to classification table. Burns and Burns (2008) state that some researchers prefer to use classification table as a measure of goodness of fit. In this case, the model is able to classify cases with 61.2% accuracy as compared with 54.5% earlier. The odds ratio is found to be 1.283 which is an improvement from the odds ratio of 1.198 before the variables are implemented.

<Table 3> Classification Table

	Observed	Predicted		
		0	1	% correct
TPA	0	0	91	0
(pre-variables)	1	0	109	100%
		Overall Accuracy		54.5%
	Observed	Predicted		
		0	1	% correct
TPA	0	53	38	58.2%
(post-variables)	1	40	69	63.3%

Brooks (2008) finds that McFadden R2 is a commonly reported measure of goodness of fit in logit regression. Table 4 provides the value of McFadden R2 (9.4%). This implies that the independent variables improve the predictive ability of the model by 9.4%. An alternative to model chi square is the Hosmer and Lemeshow test and Burns and Burns (2008) state that if the Hosmer and Lemeshow goodness of fit test statistic is greater than .05, the null hypothesis (there is no difference between observed and model predicted values) is rejected. Results in this study reveal that the level of significance (p=0.839) fails to reject the null hypothesis and the model predicted values are not different than observed values.

Table 4 presents findings from logit regression with target price accuracy as the dependent variable and number of pages, forecast horizon, number of analysts per research report and availability of resources as independent variables. Column 1

presents the independent variables, Column 2 provides the coefficients from logit regression, Column 3 provides z-statistic associated with the coefficient, and Column 4 provides the exponential function of coefficients (Odds Ratio). PAGES is the number of the pages in a research report, HORIZON is the number of years of forecasts used by analysts in their research reports, ANALYSTS is the number of analysts preparing the research reports, COMPENSATION is a dummy variable with 1 assigned to analysts working with high paying investment banks and 0 assigned to low paying investment banks, BETA is the systematic risk of stock calculated on the basis of one year historical stock price data.

<Table 4> Logit regression output

VARIABLE	COEFFICIENT	Z-STAT	ODDS RATIO
PAGES	.174***	3.950	1.190
HORIZON	-.365	-1.550	.694
ANALYSTS	-.107	-0.470	.899
COMPENSATION	-.880**	-2.070	.415
BETA	.248	0.540	1.282
CONSTANT	-.076	-0.100	.926
MCFADDEN R-SQUARE	9.4%		
HOSMER LEMESHOW TEST	p = 0.839		
LR STATISTIC	0.000		

*** Significant at 1% level ** significant at 5% level

Burns and Burns (2008) state that if LR statistics of the model has a significance at .05 level or lower, the model with the predictors is significantly different from the one with the constant only (all 'b' coefficients being zero). In this case, the LR statistic is 0.00 which indicates that the model with predictors is significantly different with the introduced variables.

The findings related to independent variables are discussed next. The number of pages written by an analyst is significantly and positively linked with target price accuracy. Analyst compensation is significantly and negatively associated with target price accuracy. The forecast horizon (the number of years of forecasts used by analysts), number of analysts employed per research report and beta of stock do not have a significant relationship with target price accuracy. However, forecast horizon and number of analysts have negative coefficients while beta has a positive coefficient.

4.2. Interpreting the Findings

The validity of model is tested using McFadden R2, Hosmer

and Lemeshow Test, LR statistic and Classification tables and all four tests indicate that the predictive ability of the model has improved after introduction of independent variables.

This study finds that a more elaborate analyst has a better understanding of the stock and writes more details on the stock in equity research report. An analyst, who explains his rationale for stock recommendation in detail, is more likely to produce an accurate forecast. If an analyst justifies his position by writing an extra page, the probability of meeting target price forecasts increases 1.19 times.

Results indicate that analyst compensation is significantly and negatively linked with target price accuracy and there are two possible reasons for this contradictory finding. First, an analyst working with a lower paying brokerage firm is highly motivated to migrate to a higher paying job. Second, an analyst working with a lower paying brokerage firm has less credibility as compared to an analyst working with a global research house and has to write much more in his report to prove his stance. The results imply that analysts working with lower paying brokerage firms are 0.415 times more likely to meet the target price forecast.

Forecast horizon is insignificant but inversely linked with target price accuracy. However, a negative coefficient indicates that an analyst thinking more about the future and less about the present is more likely to make an inaccurate target price forecast. Even though not significant, results reveal that more number of analysts per research report reduce target price accuracy. Beta is insignificant for target price accuracy but a positive sign indicates that analysts may be more accurate with high beta stocks.

5. Conclusion

This study finds that analyst practices and broker resources have a measurable impact on target price accuracy in emerging markets. The number of pages written by an analyst is significantly and directly linked with target price accuracy. Kerl (2011) reports similar evidence on German stocks and finds that analyst detail is directly related to analyst accuracy. The results in an emerging market are similar to results from developed markets indicating that even a volatile and speculative environment requires detailed analysis. Speculative forecasts with less information and lower level of analysis are bound to produce inferior results in equity research. Asquith, Mikhail and Au (2005) have suggested that target price recommendations and stock ratings are just the skin and bones of an analyst report and the meat of analyst research reports lies in the analysis and detail provided by the analyst and the findings from this research

agree with their proposition.

Analyst compensation is significantly and inversely linked with target price accuracy. This finding is against expectation that higher salaried analysts perform better than lower salaried analysts. The possible reason for lower salaried analysts performing better could be motivation to migrate to a higher paying broking firm. If an analyst consistently produces accurate target price forecasts, he can use these forecasts to impress prospective employers. This significant finding can provide further avenues for research on analyst compensation. For instance, Groysberg, Healy and Maber (2010) have recently stated that there is no evidence of analyst forecast accuracy being related to analyst compensation on US markets. It is possible that analysts with local brokers in emerging markets are more motivated than analysts with local brokers from developed markets. Past research (Asquith, Mikhail and Au (2005)) suggests that analyst optimism reduces target price accuracy and analysts with low paying broking firms appear more concerned with getting better results by having lower optimism. Analysts working with lower paying firms have controlled optimism –they expect an average increase of 23% on buy recommendations as compared to 25% for analysts working with high paying broking houses. It appears that analyst motivation is high with low paying broking firms in emerging markets but this may not be the case in developed markets. Further research in this can provide more concrete results in this regard.

The number of years of forecasts used, the number of analysts applied per research report and beta are insignificant. However, the first two have a negative coefficient and the third one has a positive coefficient with the dependent variable. One major limitation is that this research has been conducted on research reports published in an emerging market (India) and this limitation can become an area of further research.

To conclude, this research finds analysts spending more time in explaining their rationale produce more accurate forecasts, even in a volatile and speculative emerging market set up. Analyst motivation to perform better is higher while working for a lower paying brokerage and this reflects in their superior performance. This motivation is linked with prospects of migrating to a higher paying brokerage. These findings are relevant in an emerging market set up and may not hold true in developed markets.

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