IIMB Management Review (2013) **25**, 150—159

available at www.sciencedirect.com

SciVerse ScienceDirect

journal homepage: www.elsevier.com/locate/iimb

IIMB Management Review

Speed of information adjustment in Indian stock indices

P. Krishna Prasanna [a,*], Anish S. Menon [b,1]

[a] *Department of Management Studies, Indian Institute of Technology, Madras, Chennai 600036, Tamil Nadu, India*
[b] *Indian Institute of Management, Bangalore, Room No. P 214 (Hostel Block), Bannerghatta Road, Bangalore, Karnataka 560076, India*

KEYWORDS
Speed of information adjustment;
Indices;
India;
ARMA;
Cross covariance estimator

Abstract This study attempts to analyse the speed at which information gets incorporated into the various stock indices in India. Four alternate speed estimators viz., the AR (1) model, the ARMA (1, 1) model, the ARMA (1, *X*) model, and the cross-covariance estimator were calculated to estimate the rate at which information is adjusted. The lead—lag relationships between indices with varied characteristics were also analysed. It was observed that the Sensex and the Nifty indices, the constituents of which are large capitalisation stocks, led the smaller indices till 2009. This was disturbed in 2010 and 2011, especially by bank indices.

Introduction

The integration of the Indian stock market with the world markets has caused the absorption of both domestic as well as global news into the market prices and indices. The stock markets in India, viz., the Bombay Stock Exchange (BSE) and the National Stock Exchange (NSE) have developed a number of indices to gauge and understand market performance. The present study estimates the speed of information adjustment coefficients of various stock indices in India during the years 2005—2011, in order to examine the improvements in market efficiency during this period as a result of the market initiatives and integration. The speed at which the stock prices and indices adjust to new information provides lead—lag relationships in the markets and facilitates our understanding of the price discovery process. Understanding these patterns helps investors to make their investment choices and decisions.

Much of the research in this field is dedicated to finding a measure to estimate the speed of information adjustment in the stock market. The research broadly measures either the price adjustments of individual stocks and constructed portfolios or the speed with which the market indices absorb the news. The present study measures the speed of adjustments for Indian stock market indices. The visibility of the impact of reforms on the stock markets and their contribution to the efficiency of the markets can be gauged by the information assimilation by indices.

* Corresponding author. Tel.: +91 44 22574571.
E-mail addresses: pkp@iitm.ac.in, pkp_prasanna@yahoo.co.in (P.K. Prasanna), anish.menon@iimb.ernet.in (A.S. Menon).
[1] Tel.: +91 8971949951.
Peer-review under responsibility of Indian Institute of Management Bangalore

Production and hosting by Elsevier

0970-3896
http://dx.doi.org/10.1016/j.iimb.2013.05.003

In India, the studies in this area have not been as prolific as in the West. According to Marisetty (2003), and Poshakwale and Theobald (2004), the Indian markets demonstrated a general trend of under-reaction indicating a slower pace of information absorption. Acharya (2010) observed that as far as the speed of information adjustment is concerned, there is no "size effect" in the Indian stock markets. Both large and small stocks absorb the news at the same speed.

This study attempts to analyse the speed at which information gets incorporated into the various stock indices in India. Four alternate speed estimators, i.e., the Autoregressive (AR (1)) model, the Autoregressive Moving Average (ARMA (1, 1)) model, the Autoregressive Moving Average (ARMA (1, *X*)) model and the cross-covariance estimator were calculated to estimate the rate at which information is adjusted. Further, the lead—lag relationships between indices with varied characteristics have also been analysed.

This research study contributes to the existing literature on the speed of information adjustment in the Indian market, termed an emerging market in the global landscape. It also analyses the impact of the financial crisis on Indian market behaviour and on the efficiency with which information is assimilated. Such a study is of importance to both policy makers and investors. The research will help in assessing the effects of policy decisions that led to reforms, especially in the area of corporate governance, and on the working of the stock markets. Patterns in the stock price behaviour are of great importance to investors as understanding the patterns would help them in their asset allocation strategies.

The 2008 financial crisis and its aftermath affected markets across the globe. The equilibrium of the Indian markets in turn was disturbed, creating scenarios that had not been experienced before. In the context of the price discovery process, confused signals usually cause erratic behaviour in stock prices. The speed and efficiency with which the markets assimilate this information into the prices is an interesting and comparatively new territory of study in the Indian context. The fore mentioned factors motivated this study to investigate the stock market price discovery process in an index series.

The speed at which the benchmark indices, the Sensex and the Nifty, adjust to the information increased during the study period indicating an improvement in the efficiency of the Indian stock market. It was observed that these indices, the constituents of which are large capitalisation stocks, led the smaller indices. Nifty in NSE and Sensex in BSE led other indices till the year 2009. The speed of information adjustment was also higher in the Nifty and Sensex index series. The speed also improved consistently from 2005 to 2009 and was sustained during the period of financial crisis. This pattern however was disturbed in 2010 and 2011, especially in the banking indices. The Bankex, exclusively composed of banking stocks, was the most affected index during the financial crisis. The speed of information adjustment reduced substantially for this index during this time period.

The rest of the paper is as follows: The second section deals with the literature review; the third section explains the data and methodology; the fourth section presents the analysis and inference, and the fifth section presents the conclusion.

Information adjustment across indices

Indices play a unique role in information assimilation. Index constituents are the most highly traded and the most liquid stocks in case of a general index. Sectoral indices include the top performing stocks in the sector. Indices are more closely tracked than individual stocks, thereby making them more sensitive to any information that affects the economy.

There is a substantial volume of literature on how to measure the speed of information adjustment in stock prices. The studies on the speed of information fundamentally focus on two aspects: the theory defining the speed of adjustment of information; and the methodology behind measuring it. The research studies have measured the speed using regression models, correlation and autocorrelations, vector autoregression (VAR) models, autoregressive conditional heteroskedasticity (ARCH) related models, noise based, and other models.

Marisetty (2003) used the model proposed by Damodaran (1993), and corrected by Brisley and Theobald (1996) to study Indian stock indices. He observed that the Indian markets were prone to an initial phase of overreaction before the observed stock prices reflected their intrinsic values. He noted that the Indian markets were sluggish in adjusting to information as compared to their more developed Western counterparts. He attributed this to the artificial instability caused by the investors who not only had access to private information, but also preferred a fluctuating market to a stable one. He also noticed that the information available to all the market participants got adjusted much faster since the information was available to all market participants as compared to firm specific information. Using the alternative autocovariance method he reported that the BSE-Sensex is more efficient in adjusting to market information than the Nifty, which he said displays overreaction.

In their study of the indices in the BSE and the NSE, Poshakwale and Theobald (2004) analysed the cross correlation patterns to determine the lead—lag relationship between indices with large market capitalisation and those with small market capitalisation. They calculated the speed of information adjustment using five different estimators and also studied the effects of thin trading in the adjustment of information by trying to isolate the effects of pure thin trading. They found that indices with small market capitalisation were slower in adjusting to information than the indices with large market capitalisation, and also that pure thin trading effects had a considerable influence on the lead—lag patterns.

The generalised conditional autoregressive heteroskedasticity (GARCH) model was used by Sivakumar (2010) to examine the information adjustment in the BSE during intraday trading hours. He observed that new information received was given precedence for an interval of 5 min and was completely assimilated in 30 min. For estimating the speed of information adjustment of companies, he used market capitalisation as the index, and found no difference