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Market efficiency and international diversification: Evidence from India

Mehmet F. Dicle [a,*], Aydin Beyhan [b], Lee J. Yao [a]

[a] J A Butt College of Business, Loyola University New Orleans, United States
[b] Faculty of Trade, T.C. Yeditepe University, Turkey

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ABSTRACT

This study evaluates one of the most important emerging markets, India (Bombay Stock Exchange and Indian National Exchange), for its efficiency and for its potential to offer diversification benefits to international investors. Market-wide tests include; 1) contemporaneous relationship, 2) Granger type causality and 3) day-of-the-week effect. Tests on individual Indian stocks include: 1) panel estimation of Granger causality, 2) stock-by-stock estimation of Granger causality and 3) runs test. In sum, Indian markets are well integrated with the international equity markets, a characteristic that lowers the international diversification benefits. While day-of-the-week effect is an international spillover, it may be possible to predict individual Indian stocks' returns through causality with international equity markets and through momentum trading techniques.

1. Introduction

After the October 1987 crash, academic attention to international integration of financial markets is significantly heightened. Main issues are the contagion of financial crises and portfolio diversification across markets. Grubel (1968) shows the importance of international diversification that requires the existence of independent financial markets. Such independence becomes vital for the development of emerging markets to attract international investors. Any relationship (dependence, correlation, co-integration or predictability) to developed markets (or to each other) would diminish their appeal for international diversification.

This study evaluates an important emerging market, India, for its efficiency and potential to offer diversification benefits to international investors. India is chosen for several reasons. India's economy has grown significantly from about $330 billion GDP in 1990 to $1.1 trillion GDP in 2007[1]. India has also taken steps[2] to increase its international integration including the establishment of Securities and Exchange Board of India (SEBI) in 1988 and increasing ownership level of Foreign Indirect Investment (FII) to 49% in 2001. In terms of foreign direct investment (FDI) stock in India, 1990 level of $1.7 billion is increased to about $76 billion in 2007[2]. While the increase in stock of FDI in India is significant, the increase in Indian international direct investment is equally significant. In 1990, the level of international investment was $124 million and this level is increased to about $29 billion in 2007. It is important to note the important change in India's international integration both in terms of FDI towards India and FDI from India.

* Corresponding author. 6363 St. Charles Avenue, Box 15, New Orleans, LA 70118, United States. Tel.: +1 504 864 7078; fax: +1 504 864 7970.
E-mail address: mfdicle@loyno.edu (M.F. Dicle).

[1] GDP and FDI statistics are provided by; UNCTAD, World Investment Report 2008; www.unctad.org/wir or www.unctad.org/fdistatistics available through http://www.unctad.org/sections/dite_dir/docs/wir08_fs_in_en.pdf.

[2] Please refer to Misra (1997) for the history of Indian markets.

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Foreign trade data for India, as provided in Table 1, also shows the level of international trade integration achieved by India. In 1990, the total foreign trade was about $44 billion[3]. This level is increased to about $271 billion in 2006. With its biggest foreign trade partner, United States, the level is increased from $6 billion in 1990 to $34 billion in 2006. The trade relationships with China, United Arab Emirates and Singapore are also improved significantly. Most importantly, the Indian economy became more internationally integrated in 2006 than it was in 1990.

As India becomes more internationally integrated, it provides an opportunity for an important case study. With higher international integration through FDI and international trade, do markets in India become more integrated? Based on the argument about emerging markets offering diversification benefits to international investors, are Indian markets still independent equity markets? While there is academic interest to evaluate India for its potential for international diversification and for its efficiency, the results are mixed in the literature. There is evidence to support international independence and efficiency of Indian markets (i.e. Sharma & Kennedy, 1977), however, there is also evidence to support international dependence (among others; Kumar & Mukhopadyay, 2002; Wong, Agarwal, & Du, 2004; Bahng, 2005; Hassink, Bollen, & De Vries, 2008 and Sarkar, Chakrabarti, & Sen, 2008) and weak relationship (Nath & Verma, 2003). This study aims to provide robust evidence to prove whether Indian markets are independent and efficient, thus offer diversification benefits to international investors.

Two of the markets in India are analyzed individually: Bombay Stock Exchange (BSE) and Indian National Exchange (INE) for their relationship with the international equity markets and for their efficiency. International equity markets include 49 equity exchanges from 32 different countries. The data for 35,003 stocks traded on international markets and 1522 stocks traded on Indian equity markets are provided by Dicle (2008) based on Reuters[4] for the period between January, 2000 and December, 2007. Market independence and efficiency are evaluated through several tests at the market level and at the individual stock level.

First, the contemporaneous relationship is evaluated between Indian markets' returns with international equity markets' returns. In order to account for serial correlation and heteroskedasticity in the residuals, generalized autoregressive conditional heteroskedasticity (GARCH) model is employed for market-wide estimations. The results for these tests are robust to control variables such as contemporaneous market liquidity, lagged returns for international and Indian markets. Second test extends the initial evidence to evaluate whether such contemporaneous integration may be to blame for day-of-the-week effect reported in previous literature (Poshakwale, 1996; Choudhury, 2000 and Bhattacharya, Sarkar, & Mukhopadhyay, 2003) for Indian markets. In terms of market efficiency, any predictability and anomaly of returns is important to evaluate for possible explanations. Jaffe and Westerfield (1985) argue that day-of-the-week effect may be related to integration with the U.S. equity markets. Accordingly, integration with International equity markets is evaluated as a possible reason for day-of-the-week effect in Indian market returns.

While different methodologies are used in previous literature to evaluate Indian markets' independence, Granger causality models find supporting evidence for causality from international markets to Indian markets (Kumar & Mukhopadyay, 2002; Wong et al., 2004; Bahng, 2005 and Sarkar et al., 2008). Based on the evidence obtained with the initial tests, the significance of lagged international market returns provide the basis for the Granger causality from international markets to Indian markets as the third test of the study. Contemporaneous relationship and Granger causality analyses test international integration and causality, therefore international independence, for both of the Indian markets. In terms of market efficiency however, such international causality may be used to predict returns for individual Indian stocks. In order to test this possibility, a fourth test of the study evaluates individual Indian stocks for their individual causality with international markets' returns. Indian market returns, stocks' own liquidities and difference in their own squared returns (to proxy for variance in returns) are controlled within a Granger type causality model (using VAR estimation). While overall markets may or may not offer diversification benefits, there may be number of stocks in Indian markets that may offer international diversification benefits (those stocks that are not caused by international markets). Grinblatt, Titman and Wermers (1995), Nofsinger and Sias (1999) and Badrinath and Wahal (2002) show the preference of mutual funds for past winners. Gompers and Metrick (1999) argue for the institutional investors' preference for large stocks and, in addition, Ferreira and Matos (2008) argue for the preference for the higher liquidity. Therefore, international (institutional) investors may be causing Indian markets through some specific stocks with certain attributes.

The runs test is performed as the final test for this study to evaluate efficiency of the Indian markets and predictability of individual Indian stocks similar to Sharma and Kennedy (1977). The evidence provided with the runs test points to further differences between BSE and INE. The level of non-random returns may point to possible predictability for some of the Indian stocks.

The analysis of efficiency and international integration is important for India as an emerging market for its development. In prior literature, it is common to evaluate market indices for overall market efficiency. Through analysis of individual stocks as well as overall market, this study contributes to existing literature with the most comprehensive evaluation of market efficiency and international independence for both of the Indian equity markets. In the following section, related previous literature is summarized. Data description and summary statistics are provided in the third section. The main evaluation of market efficiency and independence is provided within the fourth section. Concluding remarks are the final section of the study.

[3] Foreign trade data (dyadic trade data) is provided by; Barbieri, Katherine, Omar Keshk, and Brian Pollins, 2008, Correlates of War Project Trade Data Set Codebook, Version 2.0. Online: http://correlatesofwar.org. Also, Barbieri, Katherine, Omar M. G. Keshk, and Brian Pollins, forthcoming, "TRADING DATA: Evaluating our Assumptions and Coding Rules." Conflict Management and Peace Science. Forthcoming. The version of the dataset used here is 2.01 and it is available through http://www.correlatesofwar.org/COW2%20Data/Trade/Trade.html.

[4] Through "QuoteCenter" application of Equis International available at http://www.equis.com/.