

The Impact of International Listings on Liquidity: Evidence from the Indian Stock Market*

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Abstract*

Between May 1992 and June 2001, seventy-two Indian companies tapped the international capital markets with their equity offerings in form of Depositary Receipts (DRs). Initially most of these programs were in form of Global Depositary Receipts (GDRs) and were traded on London and Luxembourg stock exchanges. Since 1999 many Indian companies have been listing their American Depositary Receipts (ADRs) on the U.S. stock exchanges. Home market responses to issuance of DRs are of interest to the policy makers, investors, market intermediaries, CFOs and finance scholars. Policy makers in emerging markets are increasingly concerned about the consequences for the domestic equity market when companies list stocks abroad. Present paper assesses the impact of listing of ADRs/GDRs on the liquidity of the firm's underlying domestic shares by using a sample of 30 Indian DR programs that listed on the foreign markets between 1st January, 1996 and 30th June, 2001. Consistent with the theoretical assertions and results of Domowitz, Glen and Madhavan (1998), we record mixed results- while ADRs listings in most cases reduce the liquidity of the domestic underlying shares, GDR listings in most cases increase the liquidity of the domestic underlying shares.

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1. Introduction

The Globalization of Indian capital markets has accelerated in the past decade. Increasing numbers of Indian firms have chosen to raise capital by issuing and listing their Depositary Receipts (DRs) on the foreign markets. As of 30th June 2001, seventy-two Indian companies have issued and listed their 84 DR programs on the foreign markets. Many other Indian companies are planning or in process of listing their DR programs in the near future. The overall research question of the present study is: Has the foreign listing of shares of Indian companies in form of their DR programs made a significant impact on the liquidity of the underlying domestic shares of these companies?

Theoretically, listing on the foreign markets should help in reducing the negative impacts of capital market segmentation¹ on firms' shares listed on the domestic markets². However, trading on multiple markets may cause fragmentation of trading volumes as has been pointed out by Amihud and Mendelson (1995). In a recent study Domowitz, Glen and Madhavan (DGM, 1998) assert, "Though corporations view cross-listings as value enhancing, the changes in the liquidity and volatility, and the cost of trading associated with order flow migration following cross-listing may adversely affect the quality of the domestic market. Such changes are especially important for emerging markets facing new competition from well-established, highly liquid markets abroad, and are the source of increasing concern among policymakers." Therefore the increasing number of DR programs from emerging countries may inhibit the development of their domestic equity markets. It is possible that large and strongest companies from these countries may rely more on the foreign markets and hence, the trading activity on their domestic exchanges will be restricted to only small and illiquid issues³. The issue of impact of foreign listing is also intimately related to the managerial decision making process. Managers perceive that foreign listing enhance the liquidity of firms' stocks in the domestic markets and thereby reduce the cost of trading in the stock (Mittoo, 1992 and Baker, 1992).

The empirical studies done so far have found that the affect of foreign listing on liquidity varies with firm specific, issue specific, market specific and country specific factors. DGM (1998) concluded that the informational linkages between host and a domestic market play a vital role in determining the final impact of the foreign listings. In a recent paper, Karoyli (1998) surveyed the empirical literature on foreign listing and found mixed evidences – while a majority of studies observed an increase in liquidity, a few studies also recorded decrease in liquidity. We present a detailed theoretical framework and a review of existing empirical literature in Section 3 of this study.

In the present study we analyze the impact of foreign listings on liquidity by taking a mixed sample of ADRs and GDRs from an emerging market⁴ of India. The major existing studies of impact of foreign listing on the underlying domestic shares have taken their samples from the large and liquid markets such as Britain, Canada, Japan and U.S. The focus of these studies is either the ADRs listings from the developed markets on the U.S. markets or the U.S. corporate equity listings on the other well-developed markets.

Our study is mainly motivated by the paucity of similar studies in context of Indian

capital market and in most other emerging markets⁵. The major studies done with samples from emerging markets are DGM (1998) and Hargis (1997). In the first study, authors examined 25 ADRs programs issued by 16 Mexican firms. Hargis (1997) studied a sample of 65 ADR programs from Latin American⁶ countries listed on U.S. exchanges.

We extend the works of DGM and Hargis (1997) in several ways. First, none of the above two studies included any listed GDRs in their sample. The focus of these studies was ADRs and Rule 144A offerings listed (traded) on the U.S. exchanges (over-the-counter market). Our sample of Indian DRs is unique⁷ and constitutes both ADRs as well as GDRs listings. This allows us to provide fresh perspectives on the issue of foreign listing by our comparison of the impact of foreign listings of Indian ADRs with the impact of foreign listings of Indian GDRs. Indian GDRs are traded on European exchanges, unlike the Indian ADRs that are traded on U.S. exchanges⁸. While the listing on the European exchanges requires the lower-quality disclosures, the listing on the U.S. markets warrant a higher-quality disclosures by the listing company. Therefore, the costs for fulfilling the disclosure requirements of the U.S. markets are higher. This raises the question whether the incremental costs of providing higher-quality disclosures are matched by the larger positive impact on the liquidity of firms' domestic underlying shares. A comparative analysis of impact of Indian ADRs with Indian GDRs on the underlying domestic shares can provide an answer to this query.

Second, stock exchanges in Latin American countries are open for trading during much of the same time when the U.S. equity markets are open. For our sample the foreign markets where Indian DRs are listed fall in different time zones compared to the domestic markets. The trading hours for Indian ADRs/ GDRs do not coincide with the trading hours of underlying domestic shares. Therefore, we expect the impact of foreign listing on liquidity of underlying domestic shares to be different in case of Indian DRs in comparison to Latin American DRs.

Third, Indian capital market presents a unique structure different from Latin American capital markets. In India capital flow barriers exist such that local investors are restricted to invest only in securities listed on Indian exchanges, while the foreign investors are allowed to invest in Indian DRs as well as other foreign stocks. A detailed discussion of the structure of Indian capital market and the regulatory framework in place for issuance of Indian ADRs/GDRs is presented in Section 2.

The remaining paper is organized as follows. Section 2 outlines the regulatory framework for issuance of Indian ADRs/GDRs. In Section 3 we start with a discussion of the concept and significance of liquidity as is applicable to the financial markets. This is followed by theoretical framework and a review of existing empirical literature related to the impact of domestic multiple listings/foreign listings on the liquidity of the existing listed shares of the firms. We state our hypothesis and describe our data, sample selection procedure and methodology for our study in Section 4. Finally we discuss our results and offer some suggestions for future research in the Sections 5 and 6.

2. Regulatory Framework for the Issuance of Indian ADRs/GDRs⁹

In July 1991, the Indian government announced the New Industrial Policy to liberalize its economy. The Securities and Exchange Board of India (SEBI) was created with statutory authority to oversee India's capital markets in 1992. SEBI initiated its reform process and introduced changes in several areas of Indian capital market. However, we focus here on reforms related to investments in Indian firms by foreign investors and to Indian firms' ability to raise capital abroad.

As part of its Economic Liberalization Policy in 1992, the Indian government permitted Foreign Institutional Investors (FIIs)¹⁰ to invest in Indian securities under specific guidelines, issued by Reserve Bank of India (RBI) and the SEBI. Other sources of foreign investment include Non-Resident Indians (NRIs), Overseas Corporate Bodies¹¹ (OCBs), DRs and Euro-Convertible Bonds. FIIs are required to register themselves with SEBI before they invest in the Indian capital market. Application for registration should be made by FIIs to SEBI in the prescribed form in duplicate. One copy of the application will be forwarded by SEBI to RBI. The Reserve Bank of India will grant permission under FERA 1973 to the bank branch designated by the applicant FII to buy/sell securities. Initial permission will be valid for five years and will be operative only after obtaining registration from SEBI. This permission will be renewed for a further period of five years on request. Reserve Bank's permission would enable the FIIs to buy/sell the securities and remit the income/dividend/sale proceeds after payment of applicable taxes through the designated bank branch. FIIs must also register with the SEC or comparable regulatory body in their respective countries of domicile or incorporation to assure the credibility of FIIs.

Under Indian SEBI regulations, Foreign Institutional Investors are allowed to buy and sell Indian securities with their total holding of an individual firm being restricted to 30 percent of issued capital (the limit can be raised to 49 percent with the approval of the board of directors of the company concerned), and holdings by a single FII are limited to 10 percent of issued capital. The ceiling of 30% or 49%, as the case may be, applicable for investment by FIIs will not include investments made by NRIs / OCBs under the Portfolio Investment Scheme. It will also not include direct foreign investment by an FII as a foreign collaborator and investment by FIIs through offshore funds, DRs and Euro-Convertible Bonds.

Indian companies are allowed to raise equity capital in international markets in the form of DRs. The DRs are denominated in nay freely convertible currency and may be listed on any International stock exchange. Several large firms took advantage of this opportunity and raised foreign equity capital in large numbers by issuing DRs on the foreign markets (see Tables 1). Initially only one way fungibility of DRs was allowed, i.e. investors owning DRs were allowed to convert them into underlying Indian shares after a delay of 45 days from the closing date of the issue. However, once converted, these Indian shares could not be reconverted back into DRs. Recently government allowed the two-way fungibility in DRs. There are no end-use restrictions on GDR/ADR issue proceeds, except restrictions on investment in stock markets and real estate.

Subsequent sale of GDRs in foreign stock markets is not subject to Indian capital gains taxes, but the dividends are taxed at a rate of 9.75%. Legal restrictions restrict arbitrage involving the DRs. A foreign investor, interested in investing in Indian equities, has primarily

two avenues of doing so. One is to register officially as a FII and buy and sell equities in the Indian stock market; the other avenue is to buy GDRs of Indian firms in overseas markets. Both these investments carry their own tax and transactional implications. In the case of FIIs, legal and institutional restrictions make it difficult for small and medium foreign investors to invest directly in the Indian stock market. For such individual investors, GDRs offer an attractive alternate avenue for investing in Indian equities. Indian citizens, who are residents of India, are restricted from buying or selling shares in foreign countries. Mutual funds are permitted to invest in ADRs/GDRs up to 10% of the net assets managed by them as on the date of the last audited balance sheet, subject to a maximum of \$50 million per mutual fund. The Indian rupee is not fully convertible and Indian residents are not allowed to hold foreign currency accounts.

Earlier the approval of Ministry of Finance (MOF) was necessary for issuing DRs. Now companies can raise money through DRs under an automatic route without the prior approval of the Ministry of Finance. However, the companies will have to fulfill the mandatory approval requirements under FDI policy and the provisions of FERA/FEMA prior to the overseas issue. The issue related expenses (covering both fixed expenses like underwriting, commissions, lead managers charges, legal expenses and other reimbursable expenses) are subject to a ceiling of 4% in the case of GDRs and 7% in the case of listing on US Exchange. Issue expenses beyond the ceiling require the prior approval of RBI. The issuing companies will have to furnish full particulars of the issue, including the underlying equity shares representing the ADRs, to the Ministry of Finance and the Reserve Bank of India within 30 days of the completion of this offering. There is no restriction on the number of ADRs/GDRs to be floated by a company or a group of companies in a financial year.

3. Liquidity- Concepts, Significance, Theoretical Framework and Empirical Evidences

In this section, we start with a survey of the concepts related to the stock market liquidity and discuss the different proxies used for market liquidity in the finance literature. A brief discussion for the significance of liquidity as applicable to the financial markets is also included. This is followed by theoretical framework and a review of existing empirical literature related to the impact of domestic multiple listings/foreign listings on the liquidity of the existing listed shares of the firms.

3.1 Concept & Significance of Liquidity

Liquidity plays a crucial role in financial markets¹². The improvement and stability of market liquidity is important for market participants and serves as a way to enhance financial market credibility. In the absence of liquidity, financial markets cannot provide accurate price signals to investors and corporations, which are crucial for efficient risk sharing and accurate investment decisions. Without the availability of counteroffers, financial markets cease to exist, and they are replaced by individualized bilateral contracts. Thus, some liquidity is necessary for the very existence of a financial market. The high levels of liquidity expand the set of potential counteroffers and enhance the probability of a favourable match. Therefore,

higher liquidity increases the expected level of satisfaction (utility) of market participants¹³. Further, there is a growing evidence of a positive relationship between asset returns and liquidity¹⁴. Hence, liquidity directly affects a firm's cost of capital and hence its willingness to undertake real investment. The debate regarding the impact of foreign listing on the liquidity of the domestic underlying shares is increasingly gaining the attention of academicians and finance researchers. Aside from the scientific merit, the issue is of direct importance to investors developing trading strategies and exchange officials attempting to identify conditions likely to disturb trading activity.

In finance literature there is no universal definition of liquidity. Liquidity of an asset can be narrowly defined as "...the ability of individuals to trade quickly at prices that are reasonable in light of underlying demand/supply conditions" (Schwartz, 1991). Darst (1975) explains that the liquidity or marketability of a security is made up of two elements-the volume of securities which can be bought or sold at one time without significantly affecting its price and the amount of time needed to complete a desired transaction. These simple definitions of asset liquidity reflect two dimensions of a desired transaction, namely speed (transaction time) and price (transaction cost). Baker (1996) reinforces this by relating illiquidity to the costs of executing a transaction in the capital markets. A cost of illiquidity exists because buyers and sellers must pay a price concession to execute orders quickly. Illiquidity is a property only of a non-frictionless market related to trading cost where trading costs like direct transaction cost, bid-ask spread, market impact cost, delay and search cost are attributable to illiquidity (Amihud and Mendelson, 1991).

In a broader sense, *market liquidity* refers to market's ability to provide immediate execution for an incoming market order [often called *immediacy*] and the ability to execute small market orders without large changes in the market price [often called *market depth* or *resiliency*] (Massimb and Phelps, 1994). It is consistent with the three attributes of a market-depth, breadth, and resiliency of a liquid market defined by Schwartz. These three attributes can lead to conflicting assessments of market liquidity. For example, a market may be deep but lack breadth. Therefore, Schwartz (1991) concludes there is no "unambiguous, operational definition of liquidity." Dubofsky and Groth (1984), and Bernstein (1987) echoed Schwartz saying that there is no single, unambiguous, theoretically correct measure of liquidity. Despite the difficulties of precisely defining and measuring market liquidity, most researchers prefer some quantitative liquidity measure. Common liquidity proxies include bid-ask spreads, trading volume, and trading turnover.

One common measure of immediacy is the *bid-ask spread*, either absolutely or relative to some base price. It is the price that market makers impose for liquidity services. The bid-ask price can be a proxy for liquidity since the trader, unsure of the true price of an illiquid stock, is prone to require a high margin for error. Also an illiquid stock is difficult to locate and deliver. In both cases, a high bid-ask price indicates a relatively illiquid stock. However, the traders are likely to use larger spreads in volatile periods, since, in such periods, uncertainty about illiquid stock's price is larger (Roll, 1984; McCulloch, 1987). However, the bid-ask spread is more directly a measure of transactions cost than liquidity and suffers from several shortcomings as a liquidity measure. First, spread alone does not capture the ability of the market mechanism to absorb a dollar volume of trading without disturbing price. Posted quotes are often valid only for small amounts of the stock. Second, the spread does not reflect the price change that is necessary for a large block of shares to trade. That is, it does not reflect the impact that market orders may have on prices. Third, the bid-ask spread fails to

account for trades occurring outside and inside the quoted spread. For example, large trades often transact outside the posted quotes and negotiated trades occur inside the posted quotes.

Another broad measure of liquidity is *dollars trading volume* where higher trading volume represents higher liquidity (Fisher, 1959; Garbade, 1976). Some researchers have also used the liquidity ratio (defined as annualized trading volume per unit market capitalization) as a metric of liquidity. In some of the recent studies, researchers have used stock-trading turnover as a proxy for liquidity (Kamara, 1994; Wolfe et al, 1992). It is expressed in the fraction form of the actual stocks traded daily with the stocks outstanding, and like trading volume, higher turnover means higher liquidity. Some criticisms of these two measures are that the reported volume may involve some double counting. Moreover, the reliance of data largely depends on the market development.

3.2 *Theoretical Framework*

Finance theory predicts several outcomes of the foreign listings for firm's liquidity on the domestic stock exchanges.

Amihud and Mandelson (1994) argued that the effect of multi-market trading is uncertain. On the one hand, they suggested that competition between markets should foster innovation and reduce trading costs. If it happens, bid-ask spreads come down and hence the market liquidity improves. On the other hand, they pointed to the possibility of fragmentation¹⁵ of trade in the multiple exchanges. Amihud and Mandelson (1994) favoured the market consolidation¹⁶ as against the multi-market trading. They suggested that the issuer should avoid multi-market trading as splitting the orders across fragmented markets lower the trading volumes and widen the bid-ask spreads. As there is little interaction between the fragmented markets, the information content of the bid-ask quotes get reduced.

The proponents for multi-market trading claim that enhanced competition between exchanges may outweigh the negative externalities associated with trading on multiple markets (Harris, 1993 and Hamilton, 1979). They base their argument on the notion that the needs and the wants of the traders are different and thus a single market cannot optimally serve the best interest of different market participants. Competition between the markets force the market makers to provide the best bid ask quotes to retain the traders and to attract the fresh traders to the market place.

Chowdhry and Nanda (CN, 1991) elaborated the conceptual framework of Admati and Pfleiderer (1988)¹⁷ in which informed investors who trade strategically to maximize the profits from their private information prefer to time their trades when the markets are 'thick' with liquidity traders, uninformed traders and risk-averse market-makers. They extended the framework to one in which there are multiple competing markets for order flow, such as for globally cross-listed stocks. They assumed existence of profit-maximizing informed traders and cost-minimizing liquidity traders. Further, CN sub-divided liquidity traders into two groups viz., 'large' liquidity traders such as institutional investors and 'small' liquidity traders who are assumed to trade exclusively on one market. They showed that trading patterns are sensitive to the relative distribution across markets of liquidity traders who do not have the flexibility to choose the location of their trading. In CN model, small liquidity traders do not

split their trades across markets. But some of them may have discretion concerning the market in which they transact. These small liquidity traders will naturally concentrate their trading on the market in which their expected trading costs are the 'smallest'. Therefore, at equilibrium, small liquidity traders who have discretion will concentrate their trading in the market that has the largest amount of liquidity trading by those who are unable to move between markets. This market, in turn, attracts more trading by the informed as well as the large liquidity traders. Their model predicts that if more than one market for a security exists, one will emerge as the dominant market, a 'winner market takes all' phenomenon. This prediction arises as liquidity traders seek markets with the lowest trading costs and informed traders maximize profitability by hiding trades on the most liquid markets. Thus while overall trading volume for a security may increase subsequent to an international listing, the domestic market may end up gaining or losing volume, depending on its ability to provide competitive trading costs and thus attract the largest number of traders with no discretion to move between markets.

Domowitz, Glen and Madhavan (DGM, 1998) model predicts that opening trade on the foreign market may reduce liquidity in both the domestic and the foreign market, if inter-market information linkages are poor. DGM asserted that transparency in the multi-market trading environment is a key success factor for improvement in liquidity in each component market. If there is a perfect quotation transparency between markets (informationally-linked), the cross listing reduces the volatility due to lower spreads from greater overall volumes and from more intense competition for order flow among market makers. By contrast, if the two markets are fragmented (informationally delinked), cross listing increases the volatility because information signals in the two markets create differences in valuation, which, in turn, results in a migration of investors to the relatively lower cost market. While the combined volume in both markets may increase with the entry of new investors upon cross listing, without transparency the diversion of order flow to one market or the other will ultimately lower market quality in both markets.

Overall, DGM suggests that CN's 'winner market takes all' hypothesis may be complicated by the degree of transparency between the two markets. Both CN and DGM predict that, as informed traders and liquidity traders strategically seek out the lowest cost market for trading, one 'winner market' will naturally emerge.

3.3 Empirical Evidences¹⁸

In all surveys of corporate managers of Canadian firms that list on the NYSE or Nasdaq or AMEX, managers cited the increase in liquidity of underlying shares to be a primary motivation for cross listing in U.S. exchanges (Mittoo, 1992; Fanto and Karmel, 1997; Foerster et al, 1998).

There exist empirical findings on the effects of multimarket trading on liquidity and spread. Baker (1996) provides an excellent literature review of the impact of trading on multiple markets with U.S. data. His review presents key results concerning the impact of a domestic multimarket listing on the variance, return and liquidity when U.S. companies have either switched to or been listed on NASDAQ, AMEX or the NYSE.

Studies of stocks listed on several international markets include e.g. Pagano & Röell

(1990), who study French stocks traded in London and conclude that the spread tends to narrow after the Paris exchange opens. In a similar study of dually listed Italian stocks in SEAQ, Pagano & Röell (1991) find that London has not taken away trading volume from Milan Stock Exchange and that the prices in general are in line with each other but there are periods when the Milan price is outside the market touch in SEAQ.

Foerster and Karolyi (1998) examined the impact on the underlying spreads of Toronto Stock Exchange (TSE) listed when they cross-listed on U.S. exchanges. They found a complex effect: the underlying bid-ask spreads of those companies that experienced a significant migration of order flow to the competing U.S. exchange declined substantially, whereas there was no impact on spreads for those that retained trading activity on the TSE. The authors attributed their observations to the effect of competition between the Canadian and American stock markets to attract the volumes. American stock exchanges appeared to be obtaining an increasingly large share of the trading volume of interlisted securities. In fact, the share of the three largest American exchanges (NYSE, AMEX and NASDAQ) in the trading volume of interlisted shares increased from 23.2 percent to 31.1 percent between 1991 and 1995.

DGM examined 25 Mexican stocks that listed ADRs on the NYSE. They found that post-listing volatility increased but (implicit) spreads declined on the Bolsa Mexicana (domestic stock exchange in Mexico) for unrestricted shares, viz., C, L or O with no foreign ownership restrictions. However, restricted shares, viz., A and B experienced no measurable liquidity effect on the Bolsa Mexicana. The unrestricted trading in former shares allowed more transparency between the U.S. and Mexican markets. They interpreted the investment restrictions as a proxy for the lack of transparency between the two markets. Their results confirmed their own hypothesis.

Noronha et al. (1996) examined the impact on liquidity of 126 AMEX/NYSE listed stocks that were subsequently listed on the London (LSE) or the Tokyo stock exchanges (TSE) between 1983 and 1989. It was expected that cross listing, due to the increased competition from listing on LSE and TSE, should improve the stock quotes, i.e. narrows the bid-ask spreads. But the test results indicated a different behavior. No change in the bid-ask spreads was observed for either the entire sample or the LSE sub-sample, on the contrary, the spreads for the TSE listings increased significantly in the post-listing period. This was in contrast to the hypothesis that increased competition should reduce the bid-ask spreads. One possible explanation provided for the lack in improvement of the spread of the quote was an increase in volume trading by informed traders (investors trading with superior information). Indeed, the results obtained showed that the level of informed trading increases for both the complete sample and the LSE sample. The depth of quotes (this is the average number of shares a market maker is willing to purchase at the quoted bid and ask prices) was the second measure of market liquidity used in the study. Here the results showed an increase in the depth of quotes of around 10 percent for the entire sample. But this increase disappears once for changes in price, volume and return variance was accounted.

Mittoo (1997) recorded an increase in trading volume (Canadian and American transaction volume) in the months following interlisting. She pointed that it was not clear whether this increase was sustainable or a temporary effect possibly related to excessive investor optimism. In a different context, Statman and Thorley (1999) recorded that an increase in trading volume may be the result of excessive investor optimism. Smith and

Sofianos (1997) studied a sample of 128 NYSE-listed non-U.S. stocks. They found that firms that access the global markets experience an increase in volume on their home market as well as on the market that they access. On average, the combined (home plus U.S.) value of trading in the sample stocks changed from \$240 million per stock per day prior to the NYSE listing to \$340 million after, a 42 percent increase. The home-market value of trading increased by 24 percent, from \$210 to \$260 million, while annual turnover increased from 65 to 90 percent. These results suggest that, on average, listing on the NYSE is not a zero-sum game, but a win-win situation with both the home market and the U.S. market benefiting. They also examined the experience of different groups of stocks. While stocks from developed markets, on average, experienced a 30 percent increase in the home-market value of trading after listing on the NYSE, stocks from emerging markets experienced only a slight increase in home trading. The increase in the combined value of trading after an NYSE listing is more pronounced for Mexican and South American stocks and for Level 3 offerings (new shares released to the public in conjunction with the NYSE listing).

Pulatkonak and Sofianos (1999) found that there is a large variability in the U.S. share of global trading of non-US stocks listed on NYSE, ranging from less than 1 percent in some stocks to more than 90 percent in others. They attributed this variability to various factors and grouped them into three groups: country specific, company specific and issue specific. Distance from the New York time zone, the time zone effect, was the most important country-specific factor. Time zone "explained" 40 percent of the variation in the U.S. market share: proximity to the New York time zone increased U.S. market share. Another important country-specific factor was whether the stock was from a developed or an emerging market. All else equal, competing with a developed home market lowered the U.S. market share by 30 percentage points. Home market commission rates were another factor influencing U.S. market share: a 10 basis points increase in home market commissions increase U.S. market share by 9 percentage points. Several issue-specific factors also affected the trading of non-U.S. stock in the U.S. For example, the U.S. market share in Level 3 offerings was 9 percentage points higher than Level 2 listings. Also, the U.S. price of the non-U.S. stock affected how much of it was traded in the U.S., with higher-priced stocks having higher U.S. market share. The most likely reason for the price effect was that higher prices relaxed the U.S. minimum tick constraint (12.5 cents in their sample) making the U.S. more competitive with the home market. Statistically, all these factors together "explain" 64 percent of the variation in U.S. market share.

Moel (2000) analyzed the effect of ADR listings from emerging markets on three aspects of development of local stock markets, viz., openness, liquidity and growth. His sample constituted firms from 28 emerging markets. He found that following ADR issues, there was an increase in transparency and a decline in liquidity & growth of the home equity market in terms of size and the number of new listings. He used accounting disclosure standards to proxy for openness of the market while liquidity was measured using the share turnover of the firms in the home market that do not list abroad. Finally growth of the home equity market was measured using the total market capitalization (using firms that do not list abroad) to gross domestic product (GDP) ratio. Moel's study indicated that listing abroad has an adverse impact on the home market liquidity and growth measured in terms of total market capitalization.

4. Hypothesis, Data Sources, Sample Selection and Methodology

The purpose of this paper is to study the impact of listings of Indian DRs on the liquidity of underlying domestic shares. We aim to study liquidity by employing one of the commonly used proxies for the liquidity, viz., the stock trading turnover¹⁹. Let V_{pre} denotes pre- foreign listing mean stock trading turnovers and V_{post} denotes post-foreign listing mean stock trading turnovers of the underlying domestic shares. The change in the mean stock trading turnover following the DR listing is referred to as mean difference ($V_{post} - V_{pre}$). The hypothesis of our interest is whether the change in the average trading turnover is equal to zero:

$$H_0: V_{post} - V_{pre} = 0.$$

Our sample is derived from eighty-four DR programs listed by seventy-two Indian companies between May 1992 and June 2001 (Table 1). We collected information about listing dates from Centre for Monitoring the Indian Economy (CMIE)'s database Prowess and supplemented this source with the electronic database of the major Indian Business daily viz., Economic Times. In some cases we found that listing dates recorded in Prowess differed from the listing dates recorded in the electronic database of the Economic Times. We resolved this issue by taking the earlier of the two dates to be the listing date.

We study the impact of listing on foreign exchanges on the liquidity of underlying domestic stocks by using the classic event-study methodology²⁰. We compare the average trading turnover and the frequencies on the pre-and post-listing periods. Trading turnover is measured as the number of shares traded daily as a proportion of the total number of shares outstanding as of that day.

The initial task of conducting an event study is to define the event of interest, the length of the estimation window and the interval of the data. The process of creating an ADR/GDR and listing in the foreign markets proceeds in four distinct steps, viz., the application date²¹, the public announcement²², the acceptance date²³ and the listing date.

The focus of our study is only on the listing date²⁴. We will examine the effect of DR listing on liquidity of underlying securities listed on the domestic markets. There are practical difficulties in using any of the other three day (viz., application date, announcement date and acceptance dates²⁵) as the event day in case of Indian ADRs. First, many Indian companies and/or exchanges of their listings do not release the information concerning the listing application in advance and therefore finding the correct application dates, announcement and acceptance dates is difficult if not impossible ex-post.

Second, several Indian companies have postponed their DR issues even after their initial application, announcement and acceptance dates. Therefore, we assume that these events have very little relevance in terms of disclosing any new information for the market participants, and hence our expectation that any significant impact on the underlying domestic stocks is observed only on/after the listing date.

Further, the listing date marks the point when the maximum effects on the underlying stock can be realized through actual trading of DRs on the stock exchange, leading to a better

price discovery and hence may affect the trading volumes on the domestic exchanges. Jayaraman et al (1993) studied the effects of ADR trading on the underlying stock. They observed a higher post listing stock return variance in their sample and attributed it to the increased trading opportunities, which can only be realized after the actual ADR listing. This distinction is very similar to that made in studies of option introduction effects on underlying stocks. Conrad (1989), for example, finds that price effects of call option introduction are much stronger around call introduction than around announcement. Thus it is important to distinguish between information revealed in actual transactions and information revealed by the announcement that a certain type of new trading opportunity will become available.

A serious problem of the event studies is that the news distinct from the event in question may affect the value of the company. This means that the sample is polluted or contaminated by other events. In principle, there are a few alternatives to handle the pollution problem. The usual procedure is to restrict the analysis to the unpolluted sample or to divide the sample into polluted and unpolluted samples or to use so large a sample that one can expect in case of unsystematic pollution that opposite effects would average out. The choice of the length of the test period is also a critical question where a balance between the length of the test period to estimate reliable parameters is weighted against the possibility that other events would affect the data and parameter estimates. We have taken a test period of 100 days pre and 100 post foreign listing. We, therefore, employ 201 days long date for each company around the foreign listing date so that the days -100 to -1 are days before listing and $+1$ to $+100$ describe the period after listing, zero denotes the actual listing date.

The daily stock trading turnover data used in this study is calculated from the data available from the Prowess database of CMIE. The Prowess provides daily volumes data of underlying domestic shares listed on the Bombay Stock Exchange (BSE) since January 1996. Our selection of stocks was determined by availability of home-market data relating to the volumes. For DR programs listed on the foreign markets prior to January 1996 home-country data were not available from Prowess, so our sample includes DR programs that were listed only after January 1996. There were only thirty-three Indian DR programs, which were listed between 1st January 1996 and 30th June 2001. Further, we eliminated those DR programs where the issuers were not listed on any of the Indian stock exchange prior to their DR programs. Therefore, our sample for purpose of turnover ratio and frequency analysis is made up of 30 DR programs done by 26 Indian companies (Table 2).

Of 30 DR programs analyzed, a majority of them are GDRs (21 programs), which are listed either on London Stock Exchange (13 programs) or on Luxembourg Stock Exchange (8 programs). The remaining 9 DR programs are ADR issues listed either on NYSE (8 programs) or on Nasdaq. Most GDR programs in our sample are privately placed and traded in US markets pursuant to the Rule 144A and Regulation S of SEC. For eight DR programs that were either listed prior to May 1996 or after February 2001 our analysis of their home-market volumes and frequency is based on a data for less than 100 days²⁶ on each side of event day.

Market wide movements in the trading volumes may affect the interpretation of our results. Therefore, we have compared our results with the market wide trading volume. Data used for assessing the market wide movements around the DR listings is taken from the website of Indiainfoline²⁷. The available data is from May 1999 onwards. Therefore our market wide analysis is limited to only 13 DRs, which were issued after May 1999.

5. Results

In order to study the impact of foreign listing on liquidity, empirical tests are conducted to study the stock-trading turnover. Tables 3, 4, 5 and 6 report our results. Table 3 provides the results of the paired ttests of changes in stock trading turnovers for each firm around the time it issues and / or lists its DR program(s) on the foreign markets. The difference in stock trading turnovers across the two periods is reported with the computed significance level of the test against the null hypothesis of a zero difference in the stock-trading turnover. In table 4 and 5 we summarize a few more results related to the impact of foreign listing on the stock trading turnover of the underlying domestic shares. In Table 6 we present the market wide movements around the listing dates of DR programs. A discussion of the results follows.

In Table 3 there is a wide variation in the effect of foreign listing on the stock-trading turnover of the underlying domestic shares. At aggregate level, DR listings have increased the stock-trading turnover in the domestic underlying shares. However this increase is not statistically significant even up to a $\alpha = 20\%$. It is clear that ADR and GDR listings create divergent impacts on the stock trading turnovers of the domestic underlying shares. Overall the ADR listings have decreased the stock trading turnovers of the domestic underlying shares. This decrease is not statistically significant upto a $\alpha = 10\%$. We extended our analysis of ADRs, separately for the NYSE and Nasdaq. Our sample included only one ADR listed at the Nasdaq. So we have not made any general conclusions concerning the impact of Nasdaq listing on the stock trading volumes. ADR listings on NYSE have decreased the stock trading volumes. This decrease is not statistically significant at 5% level. However at a significance level of 10% this decrease is significant. GDR listings at aggregate levels have created a significant positive impact on the stock trading turnovers of the domestic underlying shares. For both LSE and LxSE, the GDR listings have significantly increased the stock trading turnovers of the domestic underlying shares.

In Table 4 the aggregate stock-trading turnover in all domestic shares have increased by 6% after the DR listings. Further, Table 4 reports that ADR listings on NYSE have decreased the stock trading turnovers of the domestic underlying shares by 10%. However the ADR listings on NYSE have reduced the stock trading turnovers of the domestic underlying shares by 11%. GDR listings have increased the aggregate stock-trading turnover in domestic shares by 59%. The GDRs listings on LxSE have increased the stock trading turnovers of domestic underlying shares by 112%. This is much higher compared to an increase of only 56% by GDRs listings on the LSE.

Analysis in Table 5 shows that overall 50% of the underlying domestic shares experienced some increase in their stock trading turnover, of which only 33% are statistically significant at a $\alpha = 5\%$. Of the remaining 50% shares that experienced some decrease in the stock trading turnover in the post listing period, 27% are statistically significant at a $\alpha = 5\%$. Clearly, at aggregate level there are no identifiable patterns regarding the impact of foreign listing on the stock trading turnovers of the domestic shares. Separate analysis of ADR and GDR listings in Table 5 provided some interesting insights. The ADR listings on NYSE in 62.5% cases significantly decreased the stock-trading turnover of their underlying domestic shares. Therefore, it appears that ADR listings on the NYSE decrease the stock trading volumes. Separate analysis of GDRs shows that 52.5% GDR listings increased the stock

trading turnovers of their underlying domestic shares, of which only 33.5% are statistically significant. Of the remaining 47.5% GDR listings, which decreased the stock-trading turnovers of their underlying domestic shares, only 14% statistically significant. The results suggest that a majority of GDR listings have increased the stock-trading turnover of the underlying domestic shares. At stock exchange levels, 50% of GDR listings on LxSE have significantly increased the stock-trading turnover of their underlying domestic shares. Parallel figure for the LSE is just 23%. Thus, GDRs listings on the LxSE have a higher probability of creating a positive impact on the stock-trading turnovers of domestic underlying shares compared to the GDR listings on the LSE.

Table 6 depicts the results of market wide movements around the DR listing dates. The overall market trading volume of the market seems to affect the liquidity around the DR listing. We have limited data from May 1999 for the market wide movement. Our limited data on market movement reveals that the overall volumes of the market has decreased in the post-listing period for 62% cases and decreased in 38% of the cases. The market volumes have increased around the GDR listings as against the increase in market volumes around the ADR listings. Therefore the market-wide movements may affect our results for the impact of foreign listings on the liquidity.

Table 2 depicts the non-trading days for each of the underlying domestic shares. We can see that the trading has been very active for almost all the stocks, both during the pre-and post-listing periods. VSNL and Jagatjit Industries are the only exceptions from the general pattern.

6. Conclusions

From the above discussion, it is evident that at aggregate level there are no clear patterns for the changes in liquidity following the DR listings. However separate analysis of GDRs and ADRs is revealing of some interesting patterns. While GDR programs at large are associated with increase in the liquidity, the ADR programs at large are associated with decrease in the liquidity of the domestic shares. At stock exchange levels, GDR listings at LxSE result in a higher increase in liquidity compared to the increase in liquidity experienced by listing GDRs at LSE. Listing of ADRs on NYSE in most cases decreases the liquidity in the domestic shares. Our mixed results are similar to the results obtained in a major study by DGM (1998).

The increase in liquidity associated with the GDR listings as against the decrease in liquidity associated with the ADR listings can be interpreted in terms of more stringent disclosures and transparency requirements for the ADR listings. The GDR listings are mainly done to facilitate the investing by European Foreign Institutional Investors (FIIs). The securities market regulators and the exchange authorities for the London & Luxembourg markets, and the European FIIs investing in the Indian GDRs are satisfied with the nearly the same information that the Indian companies disclose to their domestic securities market regulator (SEBI) and domestic exchanges. Therefore, Indian companies tapping the GDR markets do not have to disclose any additional new information. The European institutional investors investing in Indian GDRs are strategic investors and usually refrain from active

trading in GDRs on their domestic exchanges. These investors follow buy and hold strategy, unless there are attractive arbitrage opportunities because of price differentials between Indian GDRs and listed underlying domestic shares. Also when most GDR issues were done, only one-way fungibility of GDRs was allowed. Therefore Indian GDRs once liquidated on any of the Indian exchanges could not be reconverted and hence volumes on Indian markets might have surged because of order flow migration of the Indian GDRs to the Indian exchanges. Further, most Indian GDR issues were done at a time when Indian markets were booming and therefore market boom might have increased the post foreign-listing liquidity on the Indian exchanges.

For ADR listings companies have to disclose additional information and also have to recast their accounts following U.S. GAAP as is required by Securities Exchange Commission (SEC). Unlike European exchanges, the U.S. exchanges demand more information disclosures and transparency from the companies. Therefore, for Indian companies going in for ADR listings, trading by the existing U.S. and international investors in the companies' securities might have migrated to the more efficient, stringent and transparent alternative trading venues in form of U.S. exchanges. Prior to the ADR listings by the Indian companies, the existing U.S. and international investors had to necessarily trade on the Indian stock exchanges. Thus, the decrease in liquidity observed for the domestic shares for the ADR listings could be attributed to the trading fragmentation. In case of GDR listings, LSE and LxSE are not able to present themselves as alternative more attractive trading venues for the existing foreign investors investing in the companies' securities. . Further, most Indian ADR issues were done at a time when Indian markets were receding and therefore reduced market volumes might have decreased the post foreign-listing liquidity on the Indian exchanges.

Other possible reasons could be the following. U.S. markets are considered to be the most active, mature and demanding in terms of information disclosures compared to their European counterparts. Hence, the Indian companies going for listings of their ADR programs have to disclose more transparent and disclose more compared to the Indian companies listing their GDRs. This may have created two different sets of the companies tapping the ADR and GDR markets respectively. Therefore the differing profiles of the companies tapping the ADR and GDR markets respectively may have some implications for the final impact of foreign listings on the liquidity of the underlying domestic shares. The varied impacts of foreign listings on the liquidity of domestic underlying shares could also be attributed to the differing informational linkages of the Indian markets with the GDR markets and the ADR markets due to the time zones in which these three markets operate. Finally market wide movements in the volumes around listing dates may have resulted in the varied impacts of ADR and GDR listings.

Our above findings are subject to the several limitations. Data used in this study is only for 30 Indian DR programs listed between January 1996 and June 2001. One can replicate the study with more number of DR programs issued over a longer stretch of time to know the temporal variation of listing effects. Our limited data of the market indicates that the market wide movements may have created distortions in our results on the impact of foreign listings on the liquidity. This also makes the case for analysis of more number of DR programs over a longer stretch of time to overcome the impact of market wide movements on the results. We have used only the volume-based proxies for the liquidity. In future it would be interesting to study the effect of foreign listings on the bid-ask spreads of the underlying shares. Similar studies can also be done in context of other emerging markets and also for the

transition economies. A wide variation in the impacts of foreign listings on the liquidity of the domestic shares indicates that a few in-depth case studies can provide additional insights on the issue. Further, market microstructure studies indicate that cost of capital, stock liquidity, returns and volatility are intimately related issues. Therefore, in future researchers should carry out studies to know the impact of foreign listings on the other variables and how all these impacts are related to each other particularly in context of the Indian capital market. In literature we have not come across any study that has studied these issues in reference to the Indian capital market.

Tables

Table 1
Frequency Distribution of Listings of Indian Firms on Foreign Exchanges

The table reports where and to which extent Indian companies are listed on different foreign exchanges as on 30th June 2001. The Luxembourg (LxSE) constitutes the most frequent listings followed by London (LSE), and then U.S. exchanges (NYSE and Nasdaq).

Type	Stock Exchange of listing	Number of DR programs
GDR	LxSE	49
GDR	LSE	23
ADR	NYSE	8
ADR	NASDAQ	4

Notes:

LxSE: Luxembourg Stock Exchange, **LSE:** London Stock Exchange, **NYSE:** New York Stock Exchange, **NASDAQ:** National Association of Securities Dealers Automatic Quotation.

Table 2**Description of Indian Depository Receipt Programs in Our Sample**

The table contains the information on DR programs in our sample by names of companies, their listing venues, DR type issued, listing date, number of days considered for the event study and frequency of non-trading days before and after foreign listing.

Issue	Market	Type of DR program	Listing Date	Days on each side of listing date in the event window	Pre-listing non-trading days	Post-listing non-trading days
APTECH	LSE	Reg S	25-Jul-00	100	0	0
BSES	LSE	144A/ Reg S	28-Feb-96	40	0	0
CROMPTON	LSE	144A/ Reg S	02-Jul-96	100	3	17
GAIL	LSE	144A/ Reg S	12-Nov-99	100	0	0
ICICI	LSE	144A/ Reg S	01-Aug-96	100	2	1
JAGATJIT	LSE	Reg S	01-May-96	79	15	20
MTNL	LSE	144A/ Reg S	03-Dec-97	100	1	0
SAIL	LSE	144A/ Reg S	06-Mar-96	44	0	0
SBI	LSE	144A/ Reg S	03-Oct-96	100	3	0
SSI	LSE	144A/ Reg S	23-Mar-00	100	0	0
TATA TEA	LSE	144A/ Reg S	02-Mar-00	100	0	0
VSNL	LSE	144A/ Reg S	01-Feb-99	100	52	21
VSNL	LSE	144A/ Reg S	24-Mar-97	100	73	70
BHARAT HOTELS	LxSE	Reg S	21-May-96	91	3	8
INDO RAMA	LxSE	144A/ Reg S	21-Mar-96	54	0	0
KESORAM	LxSE	144A/ Reg S	31-Jul-96	100	6	10
L&T	LxSE	144A/ Reg S	27-Feb-96	39	0	0
PENTAFOUR	LxSE	Reg S	19-Dec-96	100	5	5
PENTAMEDIA	LxSE	Reg S	25-Sep-97	100	5	1
TELCO	LxSE	144A/ Reg S	06-Aug-96	100	2	1
USHA BELTON	LxSE	144A/ Reg S	24-Aug-00	100	0	0
INFOSYS	NASDAQ	Level III	11-Mar-99	100	0	0
DR. REDDY	NYSE	Level III	11-Apr-01	55	0	0
I C I C I	NYSE	Level II	20-Sep-99	100	0	0
ICICI BANK	NYSE	Level III	28-Mar-00	100	0	0
SATYAM	NYSE	Level III	14-May-01	34	0	0
SILVERLINE	NYSE	Level III	20-Jun-00	100	3	0
SILVERLINE	NYSE	Level III	07-Mar-01	79	0	0
VSNL	NYSE	Level II	15-Aug-00	100	0	0
WIPRO	NYSE	Level III	19-Oct-00	100	0	0

Table 3
Comparison of the Mean Stock Trading Turnover before and after the
DR Listings

This table contains the comparison in the mean stock-trading turnover before and after the DR listing. The difference ($V_{\text{post}} - V_{\text{pre}}$) represents the change in the mean stock-trading turnover before and after the DR listing. The stock-trading turnover is defined as the fraction of the total number of paid up shares of a company being traded during a day. The last column reports significance level from the paired t-test which have been used to test whether the mean stock trading turnover have changed in the pre-and post-listing periods.

Companies/Markets	$V_{\text{post}} - V_{\text{pre}}$	2-tail Prob
All	0.000359	.232
<u>ADRs</u>	-0.001551	.111
NASDAQ	0.000402	.205
INFOSYS	0.000402	.205
NYSE	-0.001843	.099
DR. REDDY	-0.000832*	.008
ICICI (1999)	-0.001042*	.000
ICICI BANK	-0.001141*	.000
SATYAM COM	-0.006523*	.000
SILVERLINE 2000	0.025591*	.000
SILVERLINE 2001	-0.043353*	.000
VSNL 2000	0.000271*	.000
WIPRO	0.000935*	.000
<u>GDRs</u>	0.001152*	.000
LSE	0.001616*	.000
APTECH	0.008763*	.000
BSES	-0.000512*	.044
CROMPTON	-0.000062	.385
GAIL	-0.000042*	.028
ICICI	0.000024	.753
JAGATJIT IND	-0.000005	.781
MTNL	0.000400*	.000
SAIL	-0.000014	.301
SBI	-0.000208	.728
SSI	0.012050*	.000
TATA TEA	-0.001920*	.000
VSNL 1997	0.000009	.832
VSNL 1999	-0.000002	.916
LxSE	0.000364*	.000
BHARAT HOTELS	0.000046	.171
INDO RAMA	-0.000003	.951
KESORAM	-0.000024	.656
L&T	0.000214	.234
PENTAFOUR	0.000277*	.000
PENTAMEDIA	0.000365*	.009
TELCO	0.000898*	.000
USHA BELTRON	0.000848*	.002

* Indicates that the mean difference is significant at 5%.

Table 4
Percentage Change in the Mean Stock Trading Turnover after DR Listing

This table records the percentage change in the mean stock-trading turnover in the domestic underlying shares after the DR listing. Here change (in %) = $[(V_{post} - V_{pre})/V_{pre}]$, where V_{pre} represents the mean stock trading turnover before the DR listing and V_{post} represents the mean stock trading turnover after the DR listing.

Companies	V_{post}	V_{pre}	Change (in %)
All	0.006175	0.005816	6.17
<u>ADRs</u>	0.013584	0.015135	-10.24
NYSE	0.015105	0.016948	-10.87
NASDAQ*	0.003425	0.003023	13.30
<u>GDRs</u>	0.003094	0.001941	59.35
LSE	0.004507	0.002891	55.90
LxSE	0.000690	0.000326	111.66

*NASDAQ results are based on only one listing.

Table 5
Number of Significant vs. Not Significant Changes in the Mean Stock Trading Turnovers after the DR Listings

In this table we have classified all DR programs into two groups based on our analysis of impact of foreign listing on the stock trading turnovers of the underlying domestic shares. A Depositary Receipt program is grouped under $V_{post} > V_{pre}$ if the post-listing stock trading turnover of the underlying domestic shares increases. Where stock trading turnover decreases after the foreign listing, the DR program is sub-grouped under $V_{pre} > V_{post}$. Further, when a DR listing creates a significant impact on the stock trading turnovers of the underlying domestic shares, it is classified as "Significant". Otherwise, it is classified as "Not Significant". First column presents the broad markets to which the preceding classification is applied. Each row represents a single market. Figures inside the brackets represent the percentage of DR programs in a particular market falling under that subgroup. Significant level considered here is 5%.

Markets	$V_{post} > V_{pre}$		$V_{pre} > V_{post}$		Total
	Significant	Not Significant	Significant	Not Significant	
ALL	10(33%)	5(17%)	8(27%)	7(23%)	30
<u>ADRs</u>	3(33%)	1(11%)	5(56%)	0(0%)	9
NASDAQ	0(0%)	1(100%)	0(0%)	0(0%)	1
NYSE	3(37.5%)	0(0%)	5(62.5%)	0(0%)	8
<u>GDRs</u>	7(33.5%)	4(19%)	3(14%)	7(33.5%)	21
LSE	3(23%)	2(15%)	3(23%)	5(39%)	13
LxSE	4(50%)	2(25%)	0(0%)	2(25%)	8

Table 6**Comparison of the Market Volumes before and after the DR Listings**

This table contains the comparison in the average daily market volumes per company before and after the DR listing. The difference ($MV_{post} - MV_{pre}$) represents the change in the average daily market volumes before and after the DR listing. The average market volumes per company for a particular day is defined as the total number of shares traded on the entire market divided by the number of companies which at least have done one transaction on that particular day. The last column reports significance level from the paired t-test, which is used for assessing whether the average daily market volumes per company have changed in the pre-and post-listing periods.

Companies/ Markets	$MV_{post} - MV_{pre}$	2-tail Prob
ALL	-0.000750	.889
ADR	-0.009290	.324
GDR	0.010461	.000
LSE	0.004607	.000
LXSE	0.033875	.000
NYSE	-0.009290	.324
APTECH	0.028177	.000
DR. REDDY	-0.033278	.000
GAIL	-0.007191	.000
ICICI	-0.005333	.000
ICICI BANK	-0.000862	.381
SATYAM	-0.000435	.842
SSI	0.000659	.554
SILVERLINE-2000	-0.078622	.199
SILVERLINE-2001	-0.041987	.000
TATA TEA	-0.003216	.001
USHA BELTRON	0.033875	.000
VSNL	0.033428	.000
WIPRO	0.040828	.000

End Notes

1 A national capital market is considered segmented if the required rate of return on securities in that market differs from the securities of comparable risk traded in other national or international markets after adjusting for tax and foreign exchange rates (Saudagaran, 1988). The reason for capital market segmentation is the prevalence of barriers to international investment. These barriers may be direct (ownership restrictions, remittance restrictions, foreign exchange restrictions, differential judicial status, and taxes) and/or indirect (information availability, accounting standards, liquidity, market structures and system, and transaction costs) (Jorion and Schwartz, 1986; Chaplinsky and Ramchand, 2000). Capital market segmentation can be either complete or partial (Alexander et al. 1988). In a completely segmented capital markets, investors of one country are unable to invest in securities of the other country and vice versa. In contrast, a completely integrated capital market provides domestic and foreign investors with the same opportunity set that consists of all domestic and foreign securities. The entire gray area between complete segmentation and integration is called 'partial' or 'mild' segmentation. In reality most markets fall in this gray area and thus are case of mild segmentation (Stapleton and Subrahmanyam, 1977).

2 Errunza and Losq (1985) provide a model of "mild" segmentation, where investment barriers are asymmetric. In their two country model, the investors of country 1 are allowed to invest in the securities of country 2, but country 2's investors are prohibited from investing in securities from country 1. Country 2's (eligible) securities are priced as if the market was not segmented, i.e. completely integrated, but country 2's (ineligible) securities require a "super" risk premium. This premium is an increasing function of the risk aversion of unrestricted investors and the market value

of the restricted assets. It is expected to be lower when investors can form portfolios with eligible securities that closely mimic the ineligible securities returns. International listing can be viewed in this context as a means of eliminating this risk premium, and should be associated with an increase in share prices.

3 Existing foreign investors may choose to invest in DRs of emerging markets listed on their domestic stock exchanges and hence leave the exchanges in the emerging markets dry and illiquid. This is a matter of increasing concern to the stock exchange authorities, market intermediaries and the regulatory authorities in the emerging markets (Moel, 2000).

4 'Emerging economies' or 'Emerging markets' or 'Emerging countries' or 'Developing markets' mainly cover countries that the World Bank, the International Finance Corporation and the United Nations have determined to have a low or middle-income economy. Stock markets in these countries have not yet developed to the same levels of sophistication and market capitalization as in a number of developed countries. Presently 45 nations are classified as emerging markets.

5 Despite the Indian government's initiatives to gradually liberalize the Indian capital market, still some of the aspects distinguish it from its counterparts of developed economies. A few unique aspects of Indian capital market vis-à-vis the developed capital markets include the following. First, India still restricts the free convertibility of its currency. Therefore Indian investors cannot buy the stocks in the foreign markets. Second, there is lack of liquidity in many listed stocks traded on the Indian stock exchanges. Price manipulations are rampant on the Indian exchanges. Third, government regulation rules accounting practices in general, including accounting standard setting and audit practices. The disclosure of accounting information as a public good therefore follows as a result of these rules rather than being motivated by market mechanism. There is a lack of will to strictly enforce the regulations. These factors undoubtedly make Indian markets different compared the developed markets. It thus seems interesting to see whether the results of studies conducted with developed markets also carry through to the Indian stock market. The other emerging markets have similarities to the Indian market place, as described above. While it may be rash to generalize, however, the result of this study along with the existing two studies (Hargis, 1997 and DGM, 1998) may have important implications for the other emerging markets as well.

6 Argentina, Brazil, Chile and Mexico.

7 India has distinction of having maximum number of DR programs amongst all the emerging economies. A majority of Indian DR programs are issued pursuant to Rule 144A and/or Regulation S of SEC. Indian firms dominate markets for Rule 144A and/or Regulation S depository receipt programs. These programs are listed in London Stock Exchange, Luxembourg Stock Exchange and are traded in US market mainly through PORTAL system. These DR programs are categorized as Global Depository Receipts (GDRs) due to their simultaneous issuance in the more than one market. Since 1999 a few Indian firms have issued and listed their DRs specifically on the U.S. markets. These DR programs are categorized as American Depository Receipts (ADRs) and are listed in Nasdaq and NYSE (Source: Website of Bank of New York).

8 Conceivably, intermarket information linkages between the US market and Indian market are relatively different from the information linkages of Indian market with European countries.

9 The presentation of this section has been adapted from Pinegar and Ravichandran (2001).

10 Foreign Institutional Investors (FIIs) include pension funds, mutual funds, investment trusts, investment trusts, asset management companies, nominee companies & incorporated portfolio managers.

11 Overseas Corporate Bodies (OCBs) include overseas companies, partnership firms, trusts, societies and other corporate bodies which are owned directly or indirectly, to the extent of at least 60%, by individuals of Indian nationality or origin resident outside India

12 While it is common today to ascribe only beneficial properties to liquidity, such a view was not always held. Keynes, for example, viewed liquidity as destabilizing the market. Despite the fact that market liquidity, or the ability to trade costlessly, benefits individual, it may impose costs on the market by allowing or even encouraging, the flight of investors.

13 Economides (1993)

14 Amihud and Mendelson (1986, 1991), Amihud, Mendelson, and Lauterbach (1997).

15 In a fragmented market, trading order(s) in one market do not interact with trading order(s) in the other competing market(s).

16 In a consolidated market all orders interact regardless of who enters the orders. Consolidation focuses liquidity, lowers trading costs, and enhances participants' ability to transact at prices that reasonably reflect the broad market's desire to hold shares of a stock.

17 Admati and Pfleiderer (1988) showed how *informed* investors who trade strategically to maximize the profits from their information will time their trades when markets are “thick” (i.e., when their trading has little effect on prices) and trade with *liquidity* traders who are uninformed.

18 A part of this section is adapted from Karolyi (1998)

19 We have checked the robustness of our results from stock trading turnover with another volume base proxy of liquidity i.e. liquidity ratio. The results obtained were similar to the results based on stock trading turnover. For brevity results of the liquidity ratio based analysis are not presented here. In future we intend to analyze the impact of foreign listing on liquidity of domestic underlying securities by using another proxy of liquidity, viz., the historical bid-ask spreads. Later analysis will be undertaken as and when the historical bid-ask spreads will be available from National Stock Exchange or Bombay Stock Exchange. Presently the data for historical bid-ask spreads at Indian stock exchanges is not available from any of the other publicly available data sources known to us.

20 Brown & Warner (1985) explain the event study methodology.

21 When the firm or financial intermediary on behalf of firm applies to the stock exchange for listing of its DR program is the application date.

22 When the firm or financial intermediary on behalf of firm make public announcement of its foreign listing decision is the public announcement date.

23 When the stock exchange accepts the firm's application is the acceptance date.

24 Both DGM and Hargis (1997) conducted their event studies with listing date.

25 Lau, Diltz, and Apilado (1994) noted that application and acceptance dates are rarely published in newspapers and are not widely known to investors. They did not find significant excess stock returns on the application and acceptance dates. Foerster and Karolyi (1998) were able to find announcement dates for just 45 of their sample of 153 ADRs, and did not find significant effects of ADR listing announcements. In contrast, Miller (1999) and Switzer (1997) find significant positive excess returns around the announcement date, defined as the date of the first press release found in the Lexis/Nexis database.

26 For these eight DR programs the data was not available for entire test period of 100 days pre and 100 post foreign listing.

27 <http://www.indiaonline.com/stok/> (downloaded on 24.07.2000)

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