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Identification of Leaders and Followers In US-Listed Indian ADRs and Domestic Listings of Underlying Stocks

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Abstract

This paper analyzes the lead-lag relationships between American Depository Receipts of Indian companies traded on major US stock exchanges and their respective underlying stocks traded in India. The study examines the strength of predictive signals between Indian and US markets. The study finds evidence of bi-directional causality. The strength of this predictive signal is stronger when US stock index returns are used to predict Indian index returns, than when Indian index returns are used to forecast US index returns. However, individual underlying Indian stock returns are stronger predictors of corresponding individual US ADR returns than vice-versa.

Keywords: American Depository Receipts, Lead-Lag Relationships, Stock Returns

1. Introduction

The United States stock market is one of the largest and most developed financial markets in the world. As such, the size and reach of the US stock market has made it the benchmark of a 'typical' stock market. Kiersz (2014) states that 'The New York Stock Exchange is still by far the most important equity market in the world. With a market cap of about $21 trillion, the NYSE is about three times larger than the Nasdaq, and the two US exchanges together have a larger market cap than the next ten exchanges combined'. This contributes to the vast influence that US financial markets have on the global economy.

In recent years, some major developing economies have witnessed rapid growth. Their stock markets, as a result, have experienced major improvements in liquidity and efficiency, although they may not yet be on par with existing developed markets. They are thus referred to as 'emerging markets': markets potentially characterized by high returns due to economic growth, but also risky to invest in due to several factors, including lack of advanced infrastructure, bureaucracy, political instability, and stringent rules and regulations, among others. Rapid recent economic growth in their home countries has allowed companies in emerging market economies to increase the scope of their business, hire more qualified personnel, push technological bottlenecks, and venture into new lines of business. This, however, has led to increased capital requirements, and has motivated firms to raise capital outside their domestic market.

Depository receipts have become a popular instrument to satisfy this new-found demand for foreign capital. Although Indian use of this source of capital has been recent, other major economies have had depository receipts traded on major stock exchanges. Twelve Indian companies have American Depository Receipts (ADRs) listed on US stock exchanges, of which seven have cross-listings on corresponding Indian stock exchanges.

This paper analyzes lead-lag relationships between Indian ADRs listed on US stock exchanges and their corresponding stocks listed in India. The remainder of this study is organized in the following manner: Chapter 2 details the current scholarship relevant to the research, and discusses the meaning, advantages, and drawbacks of

ADRs. Chapter 3 describes the methodology used in the analysis, while Chapter 4 presents the results of the same. Chapter 5 offers conclusions about the analysis and mentions potential topics and/or variables needed to be researched further.

2. Background

2.1 Literature Review

Emerging markets have been closely tracked in recent years, and their relationships with developed markets have been analyzed. Most, although not all, emerging markets are located in the Asia-Pacific region, which is why studies have been conducted to understand the lead-lag relationships between emerging markets and existing developed markets.

Evidence exists that emerging markets' returns lag those of developed markets in terms of 'price discovery'. Cheung and Mak (1992) have a paper analyzing the causal relationships between emerging Asian stock markets and two of the world's most developed stock markets, the US and Japan, and have concluded that most Asian markets discernibly lag the US market, or specifically, that 'the US market can be considered as a 'global factor' and is found to lead most of the Asian-Pacific emerging markets with the exception of three relatively closed markets: Korea, Taiwan and Thailand (Cheung & Mak, 1992). Ghosh, Saidi, and Johnson (1999) also seem to find evidence that is consistent with this; they conclude that returns in most Asian markets can be explained by either the US market or the Japanese market. This study is similar to theirs, although considerably narrower, in that it attempts to determine if ADR returns are explained by their underlying securities (or vice-versa) for one emerging market: India.

'Price Discovery' or the process of determining the correct price of a security, is not just a function of movements in the domestic market but is also influenced in varying degrees depending upon the market in consideration by 'spillover' of information from foreign markets. This transmission of information has been well documented by Liu, Pan, and Shieh (1998), who investigate international transmission of stock price movements, and conclude not only has the inter-market flow of information increased considerably since the 1987 stock market crash, but the US market is also found to influence most other markets in the world, including most Pacific-basin markets. Other developed markets such as Singapore and Japan are also found to exercise considerable influence in the Asia-Pacific region. While this study attempts to analyze the transmission of information between US and Indian stock markets, it is particularly focused upon the lead-lag relationships between respective securities of the same companies listed in two different countries.

The strength of inter-market transmission of information can have varying degrees. Two words have been extensively used in the past to differentiate between the relative degree to which flow of information occurs between markets. 'Contagion' refers to the transmission of sizeable market disturbances from one market to another, which can be characterized by the transmission of unusual behavior of one market to the other. This contrasts with 'Interdependence,' which can be defined as common co-movement between two stock markets. Forbes and Rigobon (2002) conclude that there is no contagion between markets whatsoever, which contradicts previous studies; however, interdependence exists as a regular phenomenon between markets. Co-movement between Indian ADRs and their underlying securities is a primary focus of this analysis; however, effects of contagion between India and the US have largely been ignored, in part because no significant shocks can be spotted in either the Indian or the US stock market over the two-year period under analysis.

With regard to research specific to the area of this study, Hansda and Ray (2003) analyze the ten Indian companies having ADRs listed on US stock exchanges using a vector-auto regression (VAR) model, and conclude that there exists bi-directional causality between underlying Indian securities and their corresponding ADRs listed in the US, in addition to the transmission of positive shocks from the NSE to Nasdaq/NYSE and vice-versa. This study is similar to theirs except it uses current data and does not test for the transmission of shocks, as discussed before.

Bhattacharjee, Bang, and Mamidanna (2014) analyze the transmission of pricing information between Level-III Indian ADRs and their underlying stocks in India using VAR analysis. Employing additional procedures such as co-integration tests and stationarity tests, they conclude that bi-directional causality exists between Indian ADRs and their respective underlying securities, as a function of their pricing information along with index returns, exchange rates, and other variables.

2.2 American Depository Receipts

American Depository Receipts (ADRs) are a means for companies foreign to the United States to trade on US exchanges while avoiding numerous Securities and Exchange Commission (SEC) regulations through an organized channel of intermediaries. ADRs can be issued only by those companies which are either subject to or exempt from the SEC reporting regulations (SEC, 2012). OTC Markets defines ADRs as 'ownership interests in international securities that are issued by a US depositary bank' (OTC Markets, 2016). ADRs make it convenient for investors to invest in companies outside the United States by relying on the expertise of brokers/intermediaries and are intended to offer incentives in time and money saved.

Specific ADR types can be traded over-the-counter (OTC), making listing with the Securities and Exchange Commission not mandatory. ADRs could also be explained from the viewpoint of a representative security, traded mainly on the foundation of ADSs, or American Depository Shares. A guide by JP Morgan (2018) defines ADSs as 'a US dollar denominated form of equity ownership in a non-US company' which 'represents the foreign shares of the company held on deposit by a custodian bank in the company's home country and carries the corporate and economic rights of the foreign shares, subject to the terms specified on the ADR certificate' (JP Morgan, 2016). ADRs/ADSs are traded in US dollars, but do not avoid the risks relating to trading of foreign securities and currency exchange rates.

ADRs are registered with the SEC by using a 'Form F-6 registration statement,' which is available online.[1] According to the SEC's Office of Investor Education and Advocacy, 'disclosure under Form F-6 relates only to the contractual terms of deposit under the deposit agreement and includes copies of the agreement, a form of ADR certificate, and legal opinions. A Form F-6 contains no information about the non-US company' (SEC, 2012). Form F-6 allows for an ADR's listing on a US Stock Exchange but is not sufficient for the non-US company to raise capital in the US Market, the approval of which is possible but requires additional documentation.

Figure 2.1, provided by Deutsche Bank's Depository Receipt Services,[2] summarizes the various types of American Depository Receipts.

Type of Program	Description	SEC Filing required	Capital Raising
Unsponsored	ADRs traded on the US OTC market, using existing shares. No contractual relationship with company. Up to four depositary banks can establish	Form F-6 (filed by depositary bank), 12g3-2(b) exemption	No
Sponsored Level I	ADRs traded on the US OTC market, using existing shares. Company forms contractual relationship with single depositary bank	Form F-6 (filed by depositary bank and company, 12g3-2(b) exemption	No
Sponsored Level II	ADRs listed on a recognized US exchange (NYSE or NASDAQ), using existing shares	Form F-6, Form 20-F	No
Sponsored Level III	ADRs initially placed with US investors and listed on a recognized US exchange (NYSE or NASDAQ)	Form F-6, Form 20-F, Form F-1	Yes

Figure 2.1: Types of ADRs

2.3 Markets Involved

The primary markets involved in this analysis are the US and the Indian markets. All companies in this analysis are either listed on New York Stock Exchange (NYSE) or Nasdaq for their ADRs, or National Stock Exchange (NSE) or Bombay Stock Exchange (BSE) for their stock trading in India. These stock exchanges can be considered the leading financial trading venues in their respective countries. Table 2.1 summarizes key facts about these exchanges.

The size of the US market allows it to exert significant influence on the overall global securities market. This can be seen from summarized facts presented in Table 2.1, which shows that the market capitalization of NYSE is three times that of Nasdaq, and much larger than those of BSE and NSE, as well. Moreover, NYSE and Nasdaq combined have a market capitalization which is more than that of the next ten major stock exchanges of the world combined (Kierz, 2014).

Table 2.1: Major US and Indian Stock Exchanges

Fact	United States		India	
	New York Stock Exchange	Nasdaq	Bombay Stock Exchange	National Stock Exchange
City	New York	New York	Mumbai	Mumbai
Year of Incorporation	1817	1971	1875	1992
Number of Firms Listed[3]	2800	3100	5500	1650
Market Capitalization (2014)[4]	USD 18.36 trillion	USD 6.5 trillion	USD 1.64 trillion	USD 1.07 trillion

3. Methodology

The main hypothesis tested for this study is that 'price discovery' for the ADRs occurs in the Indian markets. In other words, domestic returns of underlying stocks in India are expected to predict behavior of ADR returns in the United States.

Data relating to adjusted stock prices of twelve Indian companies and their corresponding ADRs are downloaded from Yahoo! Finance, a popular online portal that serves as a host of financial information. We also include lead-lag relationships between the respective stock exchanges. The Standard & Poor's 500 Index (commonly referred to as the S&P 500) represents 500 of the largest corporations listed on both the NYSE and the Nasdaq and may be considered a fair representation of the overall market activity of these exchanges. Hence, to capture the overall lead-lag relationship between Indian and the US securities markets, data from S&P 500 has also been downloaded and compared to the data downloaded for the BSE Sensex Index and the NSE Nifty Index. Together, Sensex and Nifty represent 12 sectors of the Indian economy and can thus be considered as the equivalent of S&P 500 in the Indian stock market.

The primary tool used for the analysis is the univariate ordinary least squares (OLS) regression model. Univariate regression models explain movements in a given variable Y, as dependent upon the movements of a variable X, the independent variable. Regression analysis allows for summarizing dependency relationships over time periods.

The data downloaded relative to the adjusted closing prices is daily for all pertinent securities over a two-year period, from January 1, 2014 to December 31, 2015. Post downloading the data, it is found that five of the twelve firms under scrutiny do not have their listings on any Indian stock exchange. Consequently, it is not possible to conduct the following analysis for these firms,[5] which are thus excluded, and data from the remainder of the eight firms is included in the study from here.

Returns for each day are calculated for the respective securities using the following formula:

$$r_{i,t} = {}^{(p_{i,t} - p_{i,t-1})}/_{p_{i,t-1}} \quad (1)$$

Where $r_{i,t}$ is the return on security *i* on day *t*, and $p_{i,t}$ is the adjusted closing price of security *i* on day *t*. Returns hence calculated for each ADR are matched with the returns of its corresponding Indian stock by the date of trading. For example, returns on ADRs issued by Dr. Reddy's Laboratories are matched with the returns of the company's domestic stock listed on the NSE, such that both returns for a typical date, say January 5, 2014, are placed together. Descriptive statistics of the daily index returns are presented in Table 3.1. Security-level descriptive statistics are in Table 3.2.

Table 3.1: Descriptive Statistics of Daily Index Returns

Index	Average Daily Return	Median Daily Return	Minimum Return	Maximum Return	Standard Deviation of Daily Returns	Number of Observations
Sensex	0.0472%	0.0588%	-5.9362%	2.9099%	0.00916	492
Nifty	0.0546%	0.0754%	-5.9151%	2.9873%	0.00924	486
S&P 500	0.0254%	0.0348%	-3.9414%	3.9034%	0.00855	503

Returns on the Indian indices are about twice the level of returns on the S&P 500 index over our sample period, with average daily returns on the Sensex being 4.72 basis points (bps) per day, 5.46 bps for the Nifty, and 2.54 bps for the S&P 500. This is equivalent to annualized returns of about 11.99% for the Sensex, 13.76% for Nifty, and 6.40% for the S&P 500.

Table 3.2: Descriptive Statistics of Daily Security Returns

Security	Average INR Returns	Average ADR Returns	Average Exchange Rate Return	Number of Observations
Dr. Reddy's Laboratories	-0.0562%	-0.0491%		521
HDFC Bank	-0.1033%	-0.1347%		521
ICICI Bank	-0.7097%	-0.0424%		521
Infosys Limited	-0.2833%	-0.0592%	0.01233%	521
Tata Motors	-0.0316%	-0.0231%		521
Vedanta Limited	0.1040%	0.1058%		521
Wipro Limited	-0.0216%	-0.0049%		521

Due to the time difference between Mumbai, India (where BSE and NSE are located) and New York City, USA, at any given date, BSE/NSE open several hours before NYSE/Nasdaq. In fact, NYSE/Nasdaq are open for trading only after BSE/NSE have been closed for the day. Figure 3.1 is adopted from the work of Bhattacharjee, Bang, and Mamidanna (2014), and summarizes the trading hours in Indian Standard Time (IST) for the Indian and US markets.

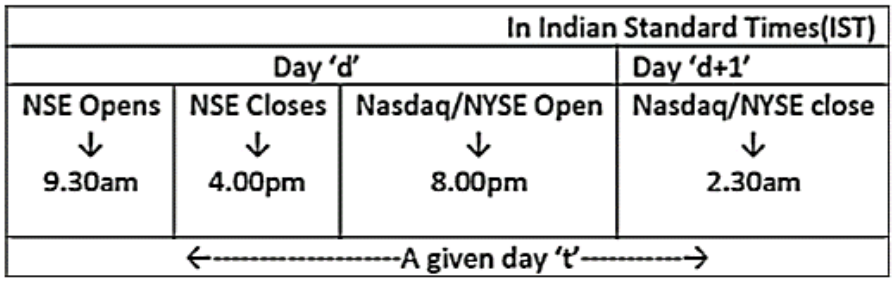

Figure 3.1: Daily Trading Hours of NSE/BSE and NYSE[6] [adopted from the work of Bhattacharjee, Bang, and Mamidanna (2014)]

Normally, to analyze lead-lag relationships one seeks to test if current day returns on a dependent security, Y_ret_t, are associated with returns of the independent security on the previous trading day (X_ret_{t-1}). That is, returns of X on day *t-1* can be used to explain returns of Y on day *t*. However, in our sample, day *t-1* does not necessarily refer to the previous 24-hour period, because our securities are located in different time zones. Because the Indian markets conclude their calendar day *t* trading before the opening of the US markets on day *t*, ADR returns for day *t* occur following Indian stock returns on day *t*, rather than day *t-1*. To properly consider time-zone differences, same calendar-day returns are used when regression models are run with ADR returns as dependent variables and domestic stock returns as independent variables. However, when analyzing the influence of ADRs on their corresponding underlying Indian securities we lag ADR returns by one day. The basic regression models are as follows:

$$India\_ret_{i,t} = \alpha_0 + \alpha_1\left(ADR\_ret_{i,t-1}\right) + \varepsilon_{i,t} \tag{2}$$

Where $India\_ret_{i,t}$ is the return on underlying stock of firm *i* on day *t*, α_0 is the return on underlying stock for ADR return of zero, α_1 is the rate of change in the return on underlying stock with respect to ADR return, $ADR\_ret_{i,t-1}$ is the return on ADR of firm *i* on day *t-1*, and $\varepsilon_{i,t}$ is the error.
And,

$$ADR\_ret_{i,t} = \beta_0 + \beta_1\left(India\_ret_{i,t}\right) + \varphi_{i,t} \tag{3}$$

Where $ADR\_ret_{i,t}$ is the return on ADR of firm *i* on day *t*, β_0 is the return on ADR for underlying stock return of zero, β_1 is the rate of change in the return on ADR with respect to underlying stock return, $India\_ret_{i,t}$ is the return on underlying stock of firm *i* on day *t*, and $\varphi_{i,t}$ is the error.

Similar regression models are developed for analyzing the 'leaders' and 'followers' between S&P 500 and Sensex and Nifty, respectively. The S&P 500 is compared to both Sensex and Nifty separately, to confirm whether the results obtained for its relation to both are similar and/or comparable. Moreover, getting similar connections of Nifty and Sensex to S&P 500 gives a single view of the relationship between the Indian and the US market at large, and should rule out discrepancies arising from potential opposite movements in the overall markets, when ADRs and their domestic stocks are compared.

The above tests can be used to determine the Granger Causality between the stock returns of included Indian companies and their respective ADRs. As explained by Granger (1969), a variable X is said to 'Granger-cause' another variable Y if changes in the values of X are (more or less) reflected in the changes in the values of Y after a certain time lag. Put another way, current values of Y must be, in part or whole, predicted by prior values of X, as determined by a specified time lag.

3.1 The Effect of Exchange Rates

For a US-listed ADR of an Indian stock, returns should be influenced by both the returns on the underlying stock in India as well any changes in the USD/INR exchange rate. When regressing ADR returns on stock returns or vice-versa, it is necessary to include the effects of exchange rates in the analysis.

For a US investor investing directly in Indian securities without the use of ADRs, the total return would include the return on the stock purchased plus any changes in the exchange rate overtime. Hence, the US return on an Indian stock equals: *[(1 + Return on Indian Stock) * (1 ± Appreciation/Depreciation in INR) – 1]*. The Indian returns used in the analysis are adjusted for the effects of daily fluctuations in exchange rates. By incorporating exchange rates, any bias that may result from the effects of exchange rates in the regression models is eliminated.

4. Results

The results obtained from running the regression models can be summarized on the in tables 4.1, 4.2, and 4.3 respectively. For Model I, with results reported in Table 4.1, we see that for every 1% change in the returns of Sensex and Nifty on day *t*, the S&P 500 increases by .2454% and .24783% respectively. On the other hand, for every 1% change in the S&P 500 for day *t-1*, the Sensex and the Nifty increase by.3935% and .3966% respectively. It is worthwhile here to mention again that due to the difference in the trading hours of the two markets, returns of the Indian market are not actually lagged due to an already present lag of the time difference. The flow of information in both ways have *p-values* less than .01. This means that there is less than 1% chance that the results obtained have occurred due to random chance. The R^2 values mean that Sensex and Nifty explain 9.78% and 10.09% of S&P 500's returns respectively, while S&P 500 explains 9.17% and 9.25% of the returns in the two Indian indexes, respectively.

Table 4.1: Lead-Lag Statistics between US and Indian Markets (Model I)

Direction of Causality	Index	Coefficient Estimate	T-statistic	P-Value	R^2
US by India	SP500 by Sensex	0.2454	7.5232	0.0000	9.78%
	SP500 by Nifty	0.2483	7.6527	0.0000	10.09%
India by US	Sensex by SP500	0.3935	7.2602	0.0000	9.17%
	Nifty by SP500	0.3966	7.2947	0.0000	9.25%

Table 4.2: Lead-Lag Relationships between ADRs and Corresponding Underlying Stocks (Model II)

Direction of Causality	Company	Coefficient Estimate	T-statistic	P-Value	R^2
ADR Returns as Predicted by Stock Returns					
	Dr. Reddy	0.7802	24.7150	0.0000	54.07%
	HDFC	0.6617	15.4654	0.0000	31.50%
	ICICI	0.0076	1.6155	0.1068	0.31%
	Infosys	0.0341	3.5575	0.0004	2.20%
	Tata	0.6634	21.3425	0.0000	46.74%
	Vedanta	0.8595	31.1627	0.0000	65.19%
	Wipro	0.4300	10.5552	0.0000	17.57%
Stock Returns as Predicted by ADR Returns					
	Dr. Reddy	0.2741	6.8997	0.0000	8.27%
	HDFC	0.1352	3.6618	0.0003	2.34%
	ICICI	1.0750	2.6232	0.0090	1.12%
	Infosys	0.1612	0.8072	0.4199	-0.07%
	Tata	0.2993	6.8946	0.0000	8.26%
	Vedanta	0.2261	5.6266	0.0000	5.60%
	Wipro	0.2453	5.8781	0.0000	6.09%

Table 4.3: Summarized Statistics of Model II

Summary Statistics	**ADR by Stk**	**Stk by ADR**
Average Coefficient Estimate	0.4909	0.3452
Average t-statistic	15.4877	4.6273
Number of positive coefficient estimates	7	7
Number of negative coefficient estimates	0	0
Significant positive coefficient estimates (P-Value<.05)	6	6
Significant negative coefficient estimates (P-Value<.05)	0	0

The results for Model II are presented in Table 4.2. As presented by Table 4.3, on average, for every 1% increase in returns of the underlying stock, ADR returns increase by .4909%, while for every 1% increase in ADR returns, returns on the corresponding security increase by .3452%. The difference in trading hours applies here as well, and all ADR returns on day *t* are predicted by stock returns on day *t*, while the latter on day *t* are predicted by the former on day *t-1*. Also, underlying stock returns are generally found to explain corresponding ADR returns much more profoundly than vice-versa, which is considerably less, but still exists. In addition, approximately 86% (6/7) of ADR returns are significantly explained by underlying stock returns. This percentage is the same for stock returns significantly explained by ADR returns.

It is interesting to note that the percentage of the return not reflected in the coefficient of determination (R^2) for either Model I or Model II for any market/security is the part of the return on the follower that is unrelated to the return of the leader. For example, 90.22% of the S&P 500 returns are unrelated to the returns of Sensex.

4.1 Robustness of the Analysis

Time difference may have a role to play in the results obtained above. Even though part of the time difference is corrected by lagging returns attributable to the US market to the last trading day while not doing so for returns in the Indian market, precise hourly time differences still affect the 'freshness' of the results obtained.

As seen above, underlying stocks predict the returns of their respective ADRs considerably stronger than do ADRs for their respective underlying stocks. However, it is important to note that, according to difference in trading hours between the Indian and the US markets as seen in Figure 3.1 in the 'Methodology' section of this report, there is a seven-hour lag from when NYSE closes until BSE/NSE opens, while there is a four-hour lag from when NSE/BSE closes until NYSE opens. Thus, a greater hourly lag between the closing time of the US markets and the opening time of Indian markets than vice-versa suggests that the Indian returns are a more 'fresh' signal for US returns, and the US returns are a more 'stale' signal for the Indian returns, which is a potential explanation for why US returns do not predict Indian returns as strongly as vice-versa.

To test the effect of time further for robustness purposes, the regression models with Indian returns as the independent variable and respective US returns as the dependent variable are run again, but this time by lagging the Indian returns to day *t-1*. Essentially, this means that Indian returns are lagged by more than the close of their last trading day. It is found by running these models again that when lagged by more than the close of their last trading day, most of the Indian returns predict almost none of the daily variation in the returns of the corresponding US returns. This is true for the predictive signal from underlying stocks to their ADRs as well as for that from the Sensex and Nifty to the S&P 500. Specifically, for securities, the average coefficient estimate is .0070, which means that for every 1% increase in Indian returns, US returns increase by merely .0070%. Moreover, the respective coefficient estimates for the markets at large dictate that for every 1% increase in the Sensex and Nifty, the S&P 500 declines by .0181% and .0186% respectively. Moreover, only about 14% of the Indian returns significantly predict US returns when lagged to day *t-1*, as compared to 86% when kept to day *t*.

In addition to the difference in specific trading hours between the two markets, there might also exist other special days which may affect the respective predictive signals from one market to another. This could include holidays specific to either the US or India, when one market is closed but the other is open.

5. Conclusion

The study finds bi-directional causality between Indian and the US markets as well as between individual securities and their respective ADRs listed on US stock exchanges at large. That is, there is a bi-directional predictive signal, and both Indian and US returns explain a part of each other. Thus, it is appropriate not to reject our original hypothesis that 'price discovery' occurs, at least partially, in the Indian markets. Moreover, price discovery occurs in the US markets as well. Our findings suggest that ~~both~~ Indian stocks returns and the returns on corresponding US-listed ADRs 'Granger-cause' each other. That is, ~~both~~ Indian stocks and their respective ADRs predict each other's current returns from their previous returns in part, with a bi-directional Granger Causality being established.

A test of robustness of the analysis reveals that time difference between the two markets exerts a significant influence on the strength of predictive signals from one market to the other. Specifically, as time passes, the ability of one market's returns to predict the other market's returns gets weaker. Again, this can be concluded because (a) US ADR returns predict lesser of Indian stock returns than vice-versa (because of a seven-hour lag between respective market timings as opposed to a four-hour lag the other way), and (b) Indian stock returns predict almost none of the US-ADR returns when lagged by more than the last trading day (or to day *t-1*).

There may exist several other factors that affect the influence of Indian returns on corresponding ADR returns or vice-versa. These factors have not been included in the analysis, which may cause a material bias. Specifically, any factors that affect the dependent variable and are also correlated with the independent variable should be explicitly included in the regression analysis. Future work may include an extension of this study to include other factors that may reduce the bias potentially existing in current results.

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7. Endnotes

1 https://www.sec.gov/about/forms/formf-6.pdf

2 Provided Publicly by Deutsche Bank [https://www.adr.db.com/drweb/public/en/content/4233.html]

3 Number approximated due to the highly dynamic nature of the variable.

4 http://www.businessinsider.com/global-stock-market-capitalization-chart-2014-11

5 These firms are MakeMyTrip Inc., Rediff.com India, Sify Technologies Limited, WNS Holdings Limited, and Videocon d2h.

6 As of October 31, 2016, NSE/BSE open at 9:15 AM. The 15-minute difference is considered immaterial in this study.