CHAPTER 1: INTRODUCTION AND MOTIVATION

1.1. INTRODUCTION

According to law of one price (*LOOP*), same asset or its perfect substitutes should trade at the same price in perfect frictionless markets. The existence of the crosslisting premium (or discounts) is a divergence from the *LOOP*. We should also understand that the *LOOP* will hold true if all of its assumptions hold true. The markets are not “perfect” and the “frictions” in market like transaction cost, differential tax structure, not only lead to existence but also persistence of deviations in prices (Serra, 1999). The markets we live in are segmented capital markets, in a perfectly integrated global capital market the prices in home and host markets will be same leading to zero crosslisting premium (or discount) (Karolyi and Stulz, 2003). Thus *LOOP* can be alternatively examined through the integration of the two markets in the context of crosslisting the home market and the host markets. We would like to examine if the home and host markets are perfectly segmented or perfectly integrated. We expect that the two markets may not be perfectly segmented but might be partially segmented.

If we find *LOOP* is violated due to imperfect and inefficient markets, we can further investigate how the segmented markets impact other aspects of crosslisting; price discovery and volatility transmission. If the markets are segmented, the time taken by the two markets to assimilate the new information in their prices might not be the same. We need to note here that crosslisted securities are affected by the news shocks arising in both home market and host market. If these markets are segmented, one market may absorb the information faster than the other in its prices. The speed with which the two markets absorb the information will also depend on the efficiency
of the two markets, which might not be the same. Thus, segmented markets may lead to inequality in the contribution of the home and host markets in asset price formation or the price discovery. The home market may dominate because most of the time information relating to the crosslisted securities is released in the home market. At the same time a firm generally crosslists itself in more developed market than its home market. In such case the host market can provide higher liquidity and lower transaction costs. If that is true an informed trader may choose to trade in host market on arrival of new information. In that case the host market will dominate the price discovery process. Thus theoretically both markets might reflect impact of news in their prices first. We would like to investigate empirically, which of the two markets, home or host reflects the information in their prices first. We would also like to examine to what extent each of the market contributes in price discovery process.

The segmented markets or LOOP might not only bear an impact on the information processing capabilities of a market, but it can also impact the information dissemination capabilities of the home and host markets. Information is captured generally through the proxy of the volatility; hence these two are used interchangeably hereafter. The two markets might not be transmitting information at same rate. One market, might transmit more information than the other. In that case the former one is called the source of volatility and the latter is called sink of volatility. Alternatively, the two markets might be called as provider and recipient of volatility respectively. The market that absorbs information faster is generally expected to transmit more information. As, any of the two markets, home and host may emerge as dominant player in price discovery, same is applicable in case of information or volatility transmission. We would examine if the volatility or information transmission within and between home and host markets
are equal or not. Also we would examine if the results for integration, price discovery and information transmission vary for different pairs of home and host markets.

1.2. MOTIVATION FOR THE STUDY

The motivation for our study stems from three important questions: 1) How do home and host markets linked (international integration)? 2) How does the new information assimilate (price discovery mechanism) in prices of non-synchronous home and host markets? and 3) How does the information transmit, within and between the home and host markets (volatility transmission mechanism)?

1.21. INTEGRATION BETWEEN HOME AND HOST MARKETS

The difference between the home and host prices of crosslisted securities are called crosslisting premium (if host market prices are higher) or crosslisting discounts (if home market prices are higher). Interesting research question is why “Law of one price (LOOP)” does not hold for crosslisted securities or simply why does crosslisting premium (discount) exists. Theoretically, in the completely integrated global market, country specific factors will be diversified away and only a certain set of global factors will be priced (Karolyi and Stulz, 2003). Hence, the two prices of the crosslisted securities in the home and host markets would be the same in perfectly integrated markets, hence eliminating crosslisting premium (discount). On the other hand in a fully segmented market only the risk associated with the local market will be priced (Serra, 1999), hence there would be high and persistent crosslisting premium (discount). Crosslisting premium (discount) exists and persists, especially in fragmented developing home markets (Serra, 1999 and Miller, 1999). In fact, crosslisting premium (discount) leads to “Cross-

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1 Serra (1999) found the crosslisting premium to be most prominent and persistence for India (home market) among the ten emerging markets studied.
Booking”, a practice of gaining arbitrage profits by buying overpriced depository receipts in host market\(^2\), converting it into underlying\(^3\) and selling off underpriced underlying in home market. The present study attempts to examine the behavior of crosslisted securities of major home (BRIC) and host (NNLL) markets\(^4\), which have different levels of openness, acceptance and restrictions for foreign investments. Hence, the markets might also have different levels of integration among themselves. It would be interesting to investigate the **varying levels of integration of the major home and host markets.**

**1.22. PRICE DISCOVERY DURING NON-SYNCHRONOUS TRADING HOURS**

Karolyi (2006) suggest that the *U.S.-centered bias in case of international cross-listings should be shed off.* The greatest limitation in doing so is the non-overlapping trading hours of developed and developing economies.

Figure 1.1: Trading hours of India with respect to its host markets

![Trading Hours Diagram](image)

Source: Compiled by Author, Time in UTC (Coordinated Universal Time)

As shown in the figure 1.1, India, one of major issuer of depository receipts, have both partial and perfect non overlapping trading hours with respect to its host markets, Europe and US

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\(^2\) Mostly the depository receipts trade at premium with respect to underlying.

\(^3\) We need to note here that conversion of the depository receipts into underlying and vice versa will subjected to the fungibility and maximum allowable limits (MAL) in the home and host markets.

\(^4\) NNLL stands for New York Stock Exchange, Nasdaq Stock Exchange, London Stock Exchange and Luxembourg Stock Exchange, the details of the major home and host markets are given in next chapter under section 2.2.
respectively. During the non overlapping trading hours the price discovery mechanism is expected to be more influenced by the market that is open. Also characteristics of the information flows mechanism might be different for the non-overlapping trading hours (Liu and An, 2011). The price discovery mechanism has not been modeled yet with controls for non-synchronous trading hours in the existing literature of crosslisting. The non-synchronism of these markets does not allow the use of Information Share (IS) model proposed by Hasbrouck (1995). Present study tries to overcome this problem by adopting Non-synchronous Information Share (NIS) for non-synchronous markets proposed by Liu and An (2011), in the context of commodity markets. The present study explores emerging economies, which have partial and perfect non overlapping trading hours with respect to their host markets\(^5\) unlike the earlier studies of mature markets with mostly perfectly overlapping trading hours.

1.23. VOLATILITY TRANSMISSION WITHIN AND BETWEEN MARKETS

Variance in price changes are better estimate of information flow compared to the price change itself, hence estimation of volatility transmission gives a better picture of information flow across markets (Ross, 1989). The existing literature has examined the volatility transmission mechanism across markets mostly with help of indices rather than individual stocks. The fluctuations in the indices (i.e. volatility) are smoothened as it is an average figure; hence individual securities are more appropriate to study the volatility transmission mechanism. Multi-market price discovery and arbitrage and “spillover” effects of cross-listings have not been explored properly and needs further examination (Karolyi, 2006). One of the interesting questions is what determines the volatility of a crosslisted security, both in home and host markets. It would be interesting to examine the impact of past shocks and past volatility of the

\(^5\)The partial and perfect non-synchronous trading hours for the major home and host markets are discussed in Section 2.3 of next chapter.
same market on the present volatility, for both home and host markets. It would be also appealing to examine if the volatility in one market is contained with the national boundary or gets transmitted to other market. Hence we would attempt to find out the relative impact of past volatilities of the same market and other market on its current volatility. The major home (BRIC) and host (NNLL) markets also have different levels of information processing and information sharing abilities. Also few have crosslisting either from multiple sources (NYSE-BRIC) or to multiple destinations (India-NNLL) and hence can exhibit different levels of proximity patterns (Sarkissian and Schill, 2004). Hence, the motive behind the study is to capture the changing dynamics of integration, price discovery mechanism and volatility transmission mechanism of crosslisted securities across the major home (BRIC) and host (NNLL) markets.

1.3. ORGANIZATION OF THE THESIS

The organization of the thesis is as follows. In the first chapter we have introduced the topic and discussed the questions that motivated us to conduct the study. The second chapter discusses the evolution of the crosslisting environment. Special emphasis is given to the varying importance of various home and host markets in crosslisting over time. This helps us to determine the target population we intend to examine in the present study. Once the target group is identified we proceed to discuss their shares in the global crosslisting. The home and host markets are spread across different time zones; hence we conclude the second chapter by discussing the partial and perfect non synchronous trading hours of the major home and host markets. In the third chapter we review the existing literature and identify research gaps. This chapter segregates the literature on three aspects of crosslisting viz; international market integration, price discovery and volatility transmission. The fourth chapter covers research methodology used for the study. It covers the objectives of the study, the hypotheses developed to fulfill the objectives and the methodology used to test the hypotheses. It also explains the sample selection process. The fifth chapter reports the empirical finding for seven home-host pairs\(^6\) of crosslisted securities. The sixth chapter concludes the study with discussion on the similarities and anomalies of results across the different pairs of home and host markets.

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\(^6\) The seven final pairs of home-host market examined in the study are- Brazil-NYSE, Russia-LSE, Russia-NYSE, India-LSE, India-LUXSE, India-NYSE and China-NYSE.