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Mergers and Acquisitions Waves in India

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ABSTRACT

The wave behavior of Mergers and Acquisitions (M&As) confused the researchers in this field for a long time. This study focused on the merger and acquisitions (M&A) wave hypothesis in India by applying Markov Regime Switching Model (MRSM) will provide a better representation of M&A wave behavior. The study has been used quarterly data collected from SDC Platinum Security database of Thomson Reuters, for the last 16 years starting from the 1999Q4 to 2016Q4. It's been recognized that there are two distinct regimes viz., the normal M&A regime and wave M&A regime. The study reveals merger activity India had wave behavior. M&As activity witnessed two waves in this period; one is at the period of the subprime financial crisis of 2008 and the Chinese stock market crash of 2015.

Keywords: Mergers and Acquisitions, M&A Wave Behavior, Markov Regime Switching Model.

INTRODUCTION:

Researchers have harmony in the notion of the wave pattern of Mergers and Acquisitions (M&As henceforth) activity. Literature indicating there are periods of intense M&As activity (Nelson, 1959; Scherer and Ross, 1990; Moody, 1904 etc). In the mid-1980s and 1990s, there were merger waves particularly in US (Harford, 2005; Mueller, 1997; Mitchell and Mulherin, 1996; Scherer and Ross, 1990 etc). After the 80s and 90s wave, there were researches seeking the causes and prompts for M&As waves (Gugler et al, 2005; Holmstrom and Kaplan, 2001; Shleifer and Vishny, 1990; Ravenscraft, 1987 etc).

While the idea of M&A waves acknowledged by the researchers, there was no harmony in by what method the wave notion in time series milieu can be operationalized. Golbe and White (1993) used sine curve in M&As activity data to identify the wave pattern. Barkoulas et al (2001); Scughart and Tollison (1984) etc. used autoregressive process which is able to produce a wave pattern. There were researches (Linn and Zhu, 1997 and Town, 1992) which have instigated Markov Regime Switching Model (MRSM hereafter) (Hamilton, 1989, 1993) to capture the immediate swing in M&As activity. MRSM is the superior methodology which provides a better expose of M&As wave.

This article seeks the wave behavior in M&As activity in India in time series context using data between 1999Q4 to 2016Q4. It uses the MRSM technique to detect the wave pattern of Indian M&As activities. Existing litterateurs explains that MRSM will provide proper depiction for M&As activity. The study will contribute the literature by examining the wave pattern of Indian M&As activity while the previous studies were focused on US and UK.

The remaining portion of this article will discuss the previous literature of M&As wave and MRSM in the

second section, the data, and methodology used for the study in third and fourth section, the empirical results in fifth section and the sixth section will be the conclusion.

REVIEW OF LITERATURE:

There is ample literature stating M&As activity will occur in waves. This section will discuss those previous studies done in this area. Bain (1944); Moody (1904); Nelson (1959) and Scherer and Ross (1990) etc are some examples of previous serious attempt in explaining the M&A wave behavior in absence of ample literature. There are contributions to the literature mainly from two broad area. The first contribution is from industrial organizations and the second one is from financial economics. The former explains the reasons of strategic interfaces between merger decisions and the latter explains how the merger wave influenced by the change in macroeconomic variables.

Most of the literature explains the M&As wave as the consecutively cogent equipoise upshot of a game which associated with the M&As activity. Clark et al. (1988); Melicher et al. (1983) etc gave a contribution to this literature by assessing the M&A activity by linear time series models which are having limitations in explaining the wave behavior. The Markov switching model was first used by Town (1992) for aggregating the US and UK M&A activities. Subsequently, Linn and Zhu (1997) and Resende (1999) also used the same for assessing the M&A wave behavior. Nilsson and Sorgard (1998) explain the management contemplates the first merger activity will inspire or deject second merger activity, and what is the impact of this merger on profit. If the benefits are sound then the first merger induces for the second one. The two-stage model will give an idea to decide between to merge or not to merge. While considering a merger between low-cost target firm and high-cost bidding firm, Fauli-Oller (2000) found a takeover wave can be elicited by a first bidder if the first deal was profitable. The basis for the result is the first firm can take advantage of the rivalry in the industry and the cost of the first merger will be lower than the following mergers. Powell and Yawson (2005) explained the industry shocks trigger merger wave. The second firm will found it is gainful to take over the low-cost firm. Merger wave in a game of rounds of negotiations, ultimately explains in the product market (Qui and Zhou, 2007). In a dynamic model proposed by Toxvaerd (2008) explains the merger wave will be influenced by exogenous economic factors. The study argued the technological shift and demand shocks will cause a merger wave. According to him, a number of acquirers will aim at a limited number of target firm over a period, they will decide between whether to take over the target immediately or postpone the deal. Here the wave is happening as the result of the battle between all the potential acquiring instantaneously. The end of the wave will happen when there is a chance of a firm stuck to merge that causes. Avenel (2008) made a successful attempt to the theory by addressing the cases of vertical M&As deals while others are focused on horizontal M&As by using Betrand oligopoly model. The study argues the technological advancement will lead to a merger wave and it will continue until the industry become fully integrated.

Mitchell and Mulherin (1996) inspected the association between different shocks and merger waves and found there are deregulation shock and technological innovation shock which influenced the 1980s merger wave in the US. Jovanovic and Rousseau (2002) proposed the q theory of mergers ie, the allocation of capital from low skill firm to high skill firm. And argued that the technological shift will cause a merger wave. The study argued the outcome of a firm is the function of the technology used and the capital. Further, the study assumes the opportunity of trading the capital. They have calculated the state of technology and value of the capital, and compare with the price used in capital trade. The value gap will provide the idea to sell or buy the capital ie merger. If this process gets larger there will be merger wave. They call it as reallocation wave. They argued after a technological shock there will be reallocation waves. Studies of Shleifer and Vishny (2003) and Rhodes-Kropf and Viswanathan (2004) suggest the overvaluation of shares will solely trigger merger waves in an economy. Shleifer and Vishny (2003) explain at the stage of the stock market boom the shares will be overvalued and the managers will take a decision of exchanging those shares with the real asset of another firm in order to protect the investor's sentiment. The wave will occur when a large number of firms are with the same motive at this particular time. Rhodes-Kropf and Viswanathan (2004) give a different opinion on the waves in the very same situation of the stock market boom. He argues the wave will happen here because the managers of target firm will be unable to estimate the price of the bidder share, or they will anticipate synergy from the deal which is not real, and the merger will happen as a mistake done by target managers. Jarrad Harford (2005) taken different shocks instead of a single shock to the account. He explains that the wave will happen due to technical, regulatory and industrial shocks.

The present study will fill the gap in the literature. The available literature is mainly considered US and UK time series data of M&As activity, but as an important emerging economy, it is important to study the wave

pattern of the Indian M&As activity.

The Data:

This study is following the previous studies and which have used the number of M&As activity as the historical merger activity. The study uses Indian mergers and acquisitions. There are two types of very recent time series data, first is the number of acquirers; the second series includes the aggregate number of M&As activity in India starting from 1999 Q4 to 2016 Q4. The data were collected from Securities Data Companies (SDC) Platinum of Thomson Reuters.

Markov Switching Model:

MRSM has become a powerful tool to assess the wave pattern with rapid shifts in a time series since Hamilton (1989) propose the tool in his study to find the pattern discrete swing in the business cycle. This study uses the MRSM to find there are two distinct regimes (intense M&As activity regime or the wave regime and the normal regime) in M&As activity.

The model states there will be two regimes or state: one is the normal regime (R_t =1) and the wave regime (R_t = 2). The study intends to identify the unobserved switches between these regimes to persuade wave behavior. It will then lead to finding determinants of unobserved state (R_t) in a particular period (t), it also finds the how the M&As activity (M_t) will be nourished by the unobserved state. MRSM take both the sequence of M&As activity ($M_1, M_2, M_3 \ldots M_t$) and sequence of state ($R_1, R_2, R_3 \ldots R_t$) as arbitrary variables, the model will generate two sequences and assess the model with observed (sequence of M&As activity) series, and treat the unobserved series (sequence of state) as missing data.

While in the determination of states, the model assumes the transition between states follows an independent first-order Markov process. In period t, the probability of swapping from one regime to another regime in period t+1 based only on the state in period t.

$$Pr\,[R_t=1 \mid R_{t-1}=1] = P_a, \qquad Pr\,[R_t=0 \mid R_{t-1}=1] = 1 - P_a \text{ and}$$
$$Pr\,[R_t=0 \mid R_{t-1}=0] = P_b, \qquad Pr\,[R_t=1 \mid R_{t-1}=0] = 1 - P_b \qquad (1)$$

The transition probabilities P_a and P_b, in any period t, will independent of past M&As activities (y_t, $y_{t-1\ldots}$). The merger waves will not be in regular periodic pattern. The length of a process in particular regime will not influence the remaining expected duration of that regime (D.L Gartner and D Halbheer, 2009). Markowitz model comprehends the indication that, once the process touches a regime it exists in that regime indeterminately. This is the case for normal regime if P_a =1 and for the wave regime P_b = 1. Contrariwise, when this is not the case P_a, P_b<1 and in addition P_a+ P_b>0. Next important point in the model is given by the ergodic regime probabilities P (R_t = i) [ie State i ∈ (1, 2). (P (R_t = i) = (1- P_a)/(2- P_a- P_b) and 1- P (R_t = i)].

The model states that the M&As activity will indication by mean reverting autoregressive (AR hereafter) process. An observed sequence of M&As activity (M_t) is a combination of two unobserved series first is AR(k) process and next is an unobserved sequence of state (R_t).

$$y_t - \alpha_{St} = \sum_{i=1}^{k} \varphi_i (y_{t-i} - \alpha_{St-1}) + \varepsilon_t \qquad (2)$$

Where ε_t is independently N (0, σ_{rt}^2), α_{rt} (α_1 ,α_2) and σ_{rt} (σ_1 and σ_2) are defined by the regime in period t, where $\alpha_2 \geq \alpha_1$, and where the AR coefficients φ_1, φ_2,...,φ_k are restricted so that the roots of the associated lag polynomial, $\varphi(L) \equiv 1 - \varphi_1 L - \varphi_2 L^2 - \cdots - \varphi_k L^k$, lie outside the complex unit circle. $\alpha_2 \geq \alpha_1$ in R_t=2, the mean will depend on the sequence of state, however AR parameters φ_1, φ_2,..., φk confirm the process is in some sense mean backsliding. α_1 is required to be large compared with α_2 and should be greater than or equal to 0 if the merger wave is a result of MRSM.

The model parameter vector $\beta \equiv (\alpha_1, \alpha_2, \sigma_1^2, \sigma_2^2, \varphi_1, \varphi_2,\ldots,\varphi_k, \rho_a, \rho_b)$ can be estimated by maximizing the likelihood function, the observed sequence of M&As activity $M_t \equiv (M_1, M_2 \ldots M_t)$ and the unobserved sequence of state $R_t \equiv (R_1, R_2 \ldots R_t)$ but the number of states set arbitrarily to 2 in the system. Inference about Probability [R_t=1| $y_t, y_{t-1\ldots}$] can be made from the likelihood function or a two lagged smoother uses the data available in period t+2 to form better estimate about Probability (R_t=1).

EMPIRICAL ANALYSIS AND RESULTS:

This section reports the result of MRSM applied to three sets of data [no of acquirers (Table 1) and aggregate M&A activities (Table 2)]. The α_t (mean of the regime), σ_t^2 (variance of the regime) and ρ (probability of being in state i) will be analyzed and report the wave found in the M&As activity series stating from 1999 Q4 to 2016 Q4.

Wave in Number of Acquirers:

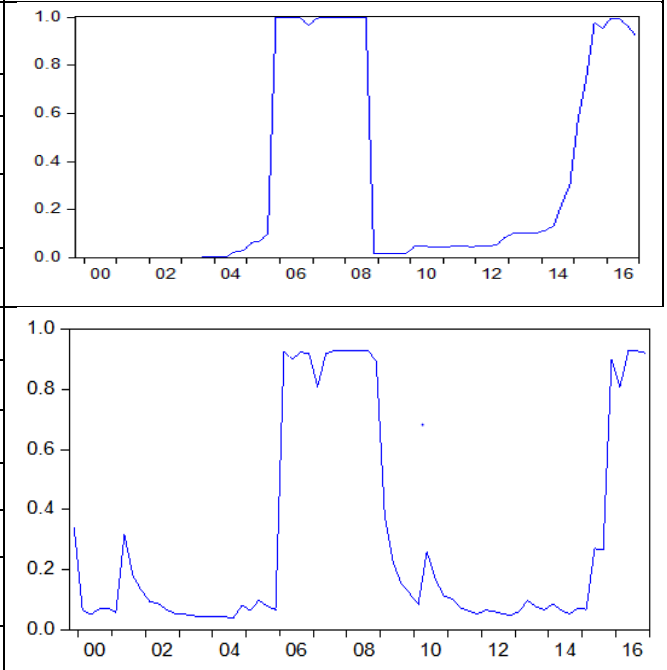
Table 1 shows the results of MRSM done for the time series number of acquirers in India.

Table 1. The result of Merger Activity as Acquirer

Parameter	Estimates	Std Error	P value
α_1	64.86075	14.78887	0.0000
α_2	13.80470	10.64792	0.0000
σ_1^2	8.566363	0.200594	0.0000
σ_2^2	5.139715	0.123451	0.0000
φ_1	0.758178	0.138835	0.0000
φ_2	0.376968	0.175167	0.0314
φ_3	-0.15637	0.149363	0.2952
ρ_a	0.963902		
ρ_b	0.929332		
Log-likelihood	-278.3997		

α_1 and σ_1^2 denote the mean and variance in state 1 and ρ_a indicates the probability of being in state 1

Figure 1. Filtered and Smoothed Probability Graph



The results indicates there is a regime shift in the series, as the α_1 (64.86075) and variance σ_1^2 (8.566363) are markedly different from the normal regime (α_2 =13.80470; σ_2^2 = 5.139715) so the large difference between the mean and variance in two regimes indicate that M&A seem to experience a regime shift. Regime one shows a wave epoch. The transition probabilities (ρ_a and ρ_b) are 0.963902and 0.929332 respectively, indicating an extensive degree of perseverance in a particular regime. ie, if the economy is in wave regime then the chance of being in that regime is high. It is the 'long swing' phenomenon for the exchange rate explained by Hamilton (1990).

Figure 1 shows the Filtered and Smoothed Probability Graph. The graph intrigues the probability of existing in a wave regime given the M&As series. And the graph produces the wave pattern of the series, and it indicates that there is intense M&A activity between 2006 and 2008 which is the period of subprime crisis. In 2015 also it is evident Chinese Stock Market Crash. The estimated probability of wave regime sudden jumps from 0.06 in 2005 Q1, 0.10 in 2005 Q2, 0.08 in 2005 Q3, 0.07 in 2005 Q4 to 0.93 in 2006 Q1. Here the wave triggered between 2005 Q4 and 2006 Q1. While at the end of the wave it jumps from 0.89 in 2008Q4 to 0.38 in 2009 Q1. In the second wave of 2015, it had jumped from 0.07 in 2015, 0.27 in 2015 Q2 to 0.81 in 2016 Q1.

The Wave in Aggregate M&As Series From 1999 Q4 To 2016 Q4:

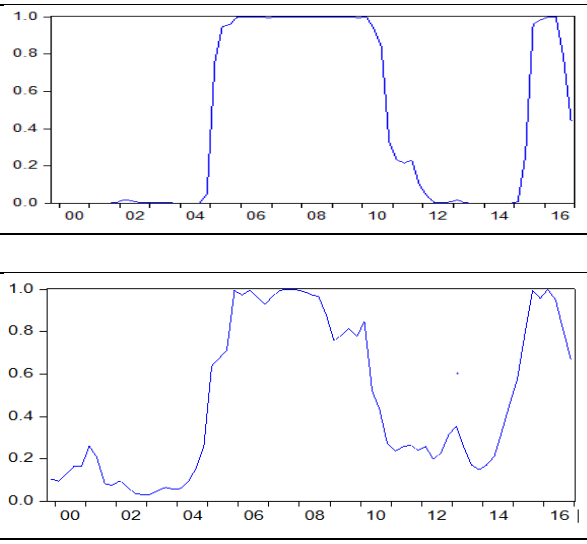
Table 2 shows the results of MRSM done for the time series aggregate M&As activity in India.

Table 2. The result of Merger Activity as Acquirer

Parameter	Estimates	Std Error	P value
α_1	94.27825	25.34548	0.0000
α_2	34.84011	19.02807	0.0000
σ_1^2	12.03884	0.170499	0.0000
σ_2^2	8.019216	0.154901	0.0000
φ_1	0.768117	0.140963	0.0000
φ_2	0.213597	0.142428	0.1337
ρ_a	0.932268		
ρ_b	0.919211		
Log-likelihood	-320.6582		

α_1 and σ_1^2 denote the mean and variance in state 1 and ρ_{11} indicates the probability of being in state 1

Figure 2. Filtered and Smoothed Probability Graph



The results indicates there is a regime shift in the series, as the α_1 (94.27825) and variance σ_1^2 (12.03884) are markedly different from the normal regime (α_2 =34.84011; σ_2^2 = 8.019216) so the large difference between the mean and variance in two regimes indicate that M&As activity series have witnessed a regime shift. Regime one shows a wave epoch. The transition probabilities (ρ_a and ρ_b) are 0.932268 and 0.919211 respectively, indicating an extensive degree of perseverance in a particular regime. This series also showing the 'long swing' phenomenon (Hamilton, 1990).

Figure 2 shows the Filtered and Smoothed Probability Graph. The graph intrigues the probability of existing in a wave regime given the M&As series. And the graph produces the wave pattern of the series, and it indicates that there is intense M&A activity between 2006 and 2009 which is the period of subprime crisis. In 2015 also it is evident Chinese Stock Market Crash. The evaluated probability of wave regime jumps from 0.62 in 2005 Q1, 0.65 in 2005 Q2, 0.68 in 2005 Q3, to a value of 0.90 in 2005 Q4. It can be concluded that the wave in the period of 2005 to 2010 is triggered between 2005 Q3 and 2005 Q4. While in normal regime it jumps from 0.96 in 2010 Q1 to 0.56 in 2010 Q2 followed by 0.47 in 2010 Q3 and 0.26 in 2010 Q4. In the second wave regime, the probability jumps from 0.59 in 2015 Q1, 0.77 in 2015 Q2 to 0.99 in 2015 Q3. The wave here triggered between 2015 Q1 and 2015 Q2.

CONCLUSION:

The present study aimed at the estimating the wave behavior in Indian M&As series by using the MRSM to very recent M&As quarterly data. The key findings suggest there is strong support for the M&A wave hypothesis in this 16 years M&As activity series by interpreting the series as mean and variance switching AR process. The wave in acquirer's series is starting from 2006 to 2008 and again shows a hike in 2015, which are the periods of subprime financial crisis 2008 and Chinese stock market crash 2015. The aggregate M&As activity series evidenced the wave starting from 2006 to 2009 and at 2015 which is again the period of economic shocks. The results are consistent with the previous works as they argue the waves in M&As series.

The study will contribute to the literature on the merger waves and we strongly believe it will be a strong foundation for the future studies and discussions. Further studies can be done on the determinants of the merger waves in India with increased and recent data. The study only takes into consideration the recent 16 years data. From the previous literature, it is evident that the important economies have witnessed merger waves in the mid-1980s and mid-1990s; this study will be more meaningful if the researcher took data from that periods.

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