The Effect of Rating Changes on Stock Returns: An Empirical Investigation

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Abstract: *The study examines the effects of rating announcements on systematic risk and abnormal return in Indian stocks from 2004 to 2017. The study finds effects on volatility, risk, and abnormal return around announcements dates indicating that rating agencies provide new information to the market. All types of rating announcements (upgrades/downgrades, reviews and outlook reports), whether positive or negative have a significant impact on risk and stock price.*

Keywords*: Rating, Abnormal Returns, Volatility, Event Study.*

I. INTRODUCTION

Papers analyzing the effect of rating agencies announcements are numerous; they test the market reaction and short-term return around rating announcement date. Rating agencies evaluate firms using financial fundamental variable, sector characteristic and macroeconomic environment. This decision is based on public information but also they access to private information. Their decision constitutes a signal to investors and market and measure the risk of firm insolvency and default of firms' debt. The rating decision can create a redistribution of wealth between stockholders and bondholders. The literature dedicated to firm performance after rating announcements is important, papers that have studied the effect on volatility are rare. The exception is given by Barron, Clare and Thomas (1997), Vassalou, Mr. Xing, Y (2005), Chen Guo and Zhang (2006).

To test the market reaction to this event, authors use generally the event study methodology and the market model to calculate the abnormal return. They ignore the risk and volatility change. In this paper we use the event study methodology that incorporates the risk dynamics. To test the volatility change around announcement date we use the GARCH model. Our purpose is to test the volatility, risk and market reaction dynamics around rating announcement in Indian stock market. We consider that research testing effect of rating revision in emergent market is rare, and our paper contributes to develop literature testing this event in emergent market. We test then the investor's valuation of firms and the market effect. We use the second generation of event study that incorporates risk dynamics to calculate abnormal return.

Event study and volatility

The classic method of event studies involves the variance stability and calculates abnormal return without incorporating risk dynamic. Thus, the economic events can have an effect on return and volatility. The financial literature considers that the incorporation of the volatility and risk in market model improves the results. Hilliard Savicks (2001) consider that volatility provides additional information that improves the performance of empirical tests. They found that the increase in volatility causes the rejection of the null hypothesis of abnormal returns existence. They consider that traditional models are less efficient and argue that volatility increases when announcement event is unanticipated by the market and that event affects return, systematic risk and volatility. Indeed, volatility and risk has been widely applied in the event study. Daadaa and Rajhi (2012) conclude the increase in volatility and specific risk after stock splits announcement date. No reaction for stock dividends is realized after announcement date. Romero and Fernandez (2006) test the risk dynamic around rating change. The effects on risk is significant for some events (stock splits, equity issue...), it appears that studies incorporating both effects (return and risk) give more realistic results.

Volatility and rating announcement

The aim of this paper is to test the effects of rating announcement on the stock performance and systematic risk. The hypothesis of informational content has been studied by many researchers. According to Wakeman (1990) rating agencies use only public information; therefore, no response is expected in announcement date. Zaima and Mc Carthu (1988) show that insolvency risk is related to the redistribution of wealth between shareholders and bondholders. They explain the market reaction by the conflict of interest between shareholders and bondholders. The lowering of credit rating reduces the bond value, causing the increase in share price. Other researchers analyze the systematic risk change. Güttler and Wahemburg (2006) suggest that ratings note signal to market the firm solvability and future prospects of companies.

In general, investors are interested in the systematic risk to take investment decisions. Indeed, any change of rating should modify investor's expectations and risk. Romero and Fernandez (2006) assume that the change in the rating is linked to the systematic risk; therefore, any change of rating should be accompanied

by a change in volatility. They consider that the ratings announcements affect volatility: a positive effect for negative rating and negative reaction for positive rating.

Pilar and Abad (2014) test the effects of six different credit rating announcements on systematic and idiosyncratic risks in Spanish stocks from 1988 to 2010. They find effects on both kinds of risk, indicating that rating agencies provide new information to the market. All types of rating announcements have a significant impact on risks.

II. DATA AND METHODOLOGY

The number of ratings announcements in India has increased since 1997; we find 40 announcements of rating revision composed by 32 positive rating and 8 negative rating. We use the market model to calculate abnormal returns around rating announcement by the rating agencies published between 2004 and 2017. The GARCH model is also used to analyze and predict volatility.

In most developed countries, bonds issues are generally preceded by rating announcement by rating agencies. Nevertheless, in India the number of companies that uses the rating is relatively low compared to those countries, the latest statistics show that the number gradually increased in recent years. The sample is divided into positive and negative rating, we consider negative ratings: the put under negative surveillance, negative perspectives and confirmations after all negative ratings. The positive rating is composed of revaluations ratings, are positive outlook and confirmations of ratings following the announcements of positive ratings. This increase in the number of ratings in a short period is mainly due to three reasons:

- Increase in the number of companies using bonds issues.
- The Indian market development, which leads to a progressive increase in the number of rated issues.
- The aim of firms to facilitate their IPO. The firms rating decision are periodically revised. These revisions reflect the improvement or deterioration of firm solvency. This change can be either change in the class, current rating or outlook changes in ratings. The announcement of this event generates change in risk and volatility and affects indirectly abnormal return.

III. MODEL

To test volatility evolution around rating announcement, we use the model used by Karafiath (1988), specified as follows:

$$R_{it} = \alpha + \beta_i R_{mt} + \gamma_{\tau,i} D_{\tau,t} + \lambda_{\tau,t} D_{\tau,t} R_{mt} + \mu_{it}$$

R_{it} is the return on stock i at time t from day -60 to -20, R_{mt} is the market return at time t, we approximate this variable through the stock market index, $\gamma_{t,i}$ is the cumulative abnormal return for firm i in event window, $\lambda_{t,t}$ test the volatility change, $D_{t,t}$is dummy variable taking on the value of one for the days in the event windows and zero otherwise and $\mu_{i,t}$ is the error term. We test the hypothesis of change in the systematic risk at the rating announcement.

Karafiath (1988) consider that the dummy variable regression method include risk change and constitute the two-step event study. We test the abnormal return and risk dynamics in the event window ranging from t = -20 to t = + 20, and the other three windows located around announcement date: (0.20) (-1.1) and (-5.5). In the first step we will estimate our model for each firm i in the sample. The estimated parameters can be affected by the presence of autocorrelation and heteroscedasticity in error term. These effects reduce efficacy of statistics tests. For this reason, we use generalized least square model to resolve residual autocorrelation. We will use the autoregressive conditional heteroskedasticity model (GARCH) to analyze volatility change around announcement date. We calculate Average Abnormal Return (AAR) and the cumulative average abnormal return (CAAR) at different event period.

$$CAAR_{\tau} = \frac{1}{N} \sum_{i=1}^{N} \gamma_{s,i}$$

N is the number of changes in ratings in the sample, we estimate $\lambda_{t,i}$ the cumulative change in systematic risk (CCB) and then we calculate the average cumulative changes in Beta CACB defined as follows:

$$CACB_{\tau} = \frac{1}{N}\sum_{i=1}^{N}\lambda_{\tau,i}$$

The null hypothesis of zero abnormal returns around ratings announcement implies that CAAR and CACB must be equal to zero. To test the statistical significance, we use the standard t test.

$$t = \frac{x\sqrt{N-1}}{\delta_x}$$

x is the CAAR or CACB.

δ_x is the standard deviation of the N estimates of $\gamma_{t,i}$ or $\lambda_{t,i}$

We use nonparametric test "Wilcoxon signed rank test" to resolve non-normality problem. We calculate the influence of ratings announcement on conditional volatility; we use Clare Barron and Thomas (1997) model.

	CAAR: γ				**CACB: λ**			
Event period	**(0;20)**	**(-20;20)**	**(-1;1)**	**(-5;5)**	**(0;20)**	**(-20;20)**	**(-1;1)**	**(-5;5)**
Mean	0,000	0,002	0,009	0,001	0,087	0,012	1,247	0,313
Mediam	0,000	0,001	0,000	0,000	0,063	0,076	0,047	0,128
STD	0,003	0,003	0,020	0,006	0,602	0,734	4,500	1,082
t-test	0,628	1,612	**2,776**	0,212	0,189	0,799	**1,894**	**2,531**
p-value	0,532	0,112	**0,007**	0,833	0,850	0,427	**0,063**	**0,014**
test wilcoxon	0,313	**2,937**	**2,039**	0,064	1,196	**2,052**	1,321	**2,809**
p-value	0,755	**0,003**	**0,041**	0,949	0,232	**0,040**	0,187	**0,005**

Table (1) Positive rating effect on CAR and CCB

	CAAR : γ				**CACB : λ**			
Event period	**(0; 20)**	**(-20; 20)**	**(-1; 1)**	**(-5; 5)**	**(0; 20)**	**(-20; 20)**	**(-1; 1)**	**(-5; 5)**
Mean	0.000728	-0.001036	-0.002500	-0.000418	-0.017710	-0.071987	0.086033	0.129946
Mediam	0.001149	-0.001007	0.000343	-0.000538	-0.000361	-0.051286	0.054867	0.094087
STD	0.004028	0.002818	-0.066375	0.005733	0.639175	0.777318	0.225115	0.224331
t-test	1.711591	1.707100	0.465941	0.107768	1.039868	1.534246	0.006894	1.048302
p-value	0.0918	0.0927	0.6428	0.9145	0.3023	0.1299	0.9945	0.2984
test wilcoxon	**2.192984**	**2.218633**	0.730995	1.282447	1.295271	0.936186	0.705346	**2.116037**
p-value	0.0283	0.0265	0.4648	0.1997	0.1952	0.3492	0.4806	0.0343

Table (2): Negative rating effect on CAR and CCB

	CAAR : γ				**CACB : λ**			
Event period	**(0;20),**	**(--20;20)**	**(-1;1)**	**(-5;5)**	**(0;20)**	**(-20;20)**	**(-1;1)**	**(-5;5)**
Mean	0,00	0,00	0,00	0,00	0,01	-0,03	1,02	0,11
Mediam	0,00	0,00	0,00	0,00	-0,10	0,19	0,08	0,01
STD	0,00	0,01	0,03	0,01	0,69	1,12	4,90	0,80
t-test	**2,49**	**2,09**	0,53	0,87	0,66	0,59	0,83	0,81
p-value	**0,02**	**0,04**	0,60	0,39	0,51	0,56	0,41	0,42
test wilcoxon	**2,91**	**2,37**	1,26	1,58	0,96	0,09	0,15	0,72
p-value	**0,00**	**0,02**	0,21	0,11	0,34	0,92	0,88	0,47

Table (3) : Negative rating effect on CAR and CCB for financial firms

	CAAR : γ				**CACB : λ**			
Event period	**(0;20)**	**(-20;20)**	**(-1;1)**	**(-5;5)**	**(0;20)**	**(-20;20)**	**(-1;1)**	**(-5;5)**
Mean	0,00	0,00	0,00	0,00	0,11	0,06	-0,43	0,27
Mediam	0,00	0,00	0,00	0,00	0,07	0,06	0,00	0,10
STD	0,00	0,00	0,02	0,01	0,59	0,31	1,37	0,86
t-test	0,68	0,84	0,05	0,89	0,79	0,27	0,91	0,82
p-value	0,51	0,41	0,96	0,38	0,44	0,79	0,37	0,42
test wilcoxon	0,26	0,26	0,36	0,00	0,56	0,77	0,46	0,15
p-value	0,80	0,80	0,72	1,00	0,57	0,44	0,64	0,88

Table (4) : Negative rating effect on CAR and CCB for non financial firms

	CAA : γ				**CACB : λ**			
Event window	**(0;20)**	**(-20;20)**	**(-1;1)**	**(-5;5)**	**(0;20)**	**(-20;20)**	**(-1;1)**	**(-5;5)**
Mean	0,00	0,00	0,01	0,00	0,05	-0,05	-1,20	-0,53
Mediam	0,00	0,00	0,00	0,00	-0,06	-0,11	-0,05	-0,32
STD	0,00	0,00	0,02	0,01	0,58	0,71	5,02	1,16
t-test	1,08	1,42	**2,50**	0,41	0,59	0,96	1,22	**2,59**
p-value	0,29	0,16	**0,02**	0,68	0,56	0,34	0,23	**0,01**
test wilcoxon	1,28	**3,32**	**2,29**	0,04	1,61	**1,91**	0,76	**3,30**
p-value	0,20	**0,00**	**0,02**	0,97	0,11	**0,06**	0,45	**0,00**

Table (5) : Positive rating effect on CAR and CCB for financial firms

	RA : γ				**CACB : λ**			
Fenêtre d'évébement	**(0;20)**	**(-20;20)**	**(-1;1)**	**(-5;5)**	**(0;20)**	**(-20;20)**	**(-1;1)**	**(-5;5)**
Mean	0,00	0,00	0,01	0,00	0,16	0,09	-1,23	0,00
Mediam	0,00	0,00	0,00	0,00	0,05	-0,05	-0,09	0,00
STD	0,00	0,00	0,02	0,01	0,65	0,78	3,29	0,00
t-test	0,04	1,54	1,32	0,09	0,37	0,28	1,46	0,19
p-value	0,97	0,14	0,20	0,93	0,71	0,78	0,16	0,85
test wilcoxon	1,01	0,84	0,14	0,20	0,03	1,24	0,61	0,66
p-value	0,31	0,40	0,89	0,84	0,98	0,21	0,54	0,51

Table (6) : Positive rating effect on CAR and CCB for non financial firms

IV. RESULT AND INTERPRETATION

The results of the event study, presented in tables 1 to 6 present the estimated results of the event study. Tables show the mean, median, standard deviation of abnormal returns and cumulative changes in Beta, we also calculated the t-test, Wilcoxon signed rank test for each event period. Table (1) shows significant abnormal return to the post-event periods in the period [1; 1]. This market reaction is due to the informational advantage of rating agencies. To generate abnormal return, investors increase their trading in the market and then cause the raise stocks prices after announcement date. Then, we corroborate Elayan, Hsu and Meyer (2003) and Romero and Fernandez (2006) results respectively on the Spanish and New Zealand market. They found a significant market reaction to announcements of positive ratings. In the case of cumulative changes in Beta, a significant change was observed in both periods event [-20.20] and [-1,1] respectively from Wilcoxon test and t-test and a significant effect for the period [-5;5] with CCB equal to (-0.31); This result proves the decrease of systematic risk at positive ratings announcement. For the negative rating, the abnormal return is significant in event period. We confirm the results of Daadaa and Chebbi (2016) that conclude a negative effect after negative rating announcement. Thus, the incorporation of information is not made immediately but after a few days. This result refutes the event study hypothesis.

The analysis of volatility change showed that negative rating announcement has a significant effect on the period [-5;5]. This result proves that rating announcement should be accompanied by systematic risk change. The existence of abnormal returns and risk change at the positive and negative rating announcement confirms the hypothesis of informative content. This result corroborates the results of Romero and Fernandez (2006) which conclude that ratings are linked to rise of systematic risk. We divide sample into two sub sample composed by positive rating (Sub sample 1) and negative rating (sub sample 2) and then by financial and non-financial firms. The results show that rating announcement is a source of information for the financials firms. We found a significant decrease in risk associated with this event; volatility change is significant for downgrades and upgrades of ratings announcements. We confirm result of Nelson (1991) but contradict, Barron, Clare and Thomas (1997) who conclude that this event has no significant effect on volatility. In summary, it appears that the ratings announcements have information content used by investors. These findings show the important role played by rating agencies that has a real information advantage on the market.

V. CONCLUSION

In this paper, we studied the impact of ratings announcements on stock price and volatility in Indian financial market. Initially, we used the event study methodology that incorporates the dynamics of risk. We investigated also the volatility varying around rating announcement. The study focused on the period 2004-2017 testing downgrades and upgrades ratings. We use market model that calculates abnormal return and incorporate volatility dynamic around announcement date. We then calculated the abnormal returns and cumulative changes in Beta (CCB). The study was conducted over four event periods and two types of announcements: positive and negative rating. The generalized least squares (GLS) model was used to estimate our model. The estimation is performed on two sub-samples: the positive and negative ratings and two sub samples classified by firms activities. Our results show that investors react to positive and negative ratings and that volatility changes around this event. We conclude that ratings announcement affects volatility on the financial market. This finding contradicts that of Barron, Clare and Thomas (1997) who believe that ratings have no effect on volatility. This result corroborates the result of Romero and Fernandez (2006) in Spanish market. We also noticed that the rating is a source of information for the financial sector. This reflects the dominance of financial firms in the sample and the importance of the information published by the rating agencies.

VI. REFERENCES

[1] *Barron. M Clare,A and Thomas.S (1997) "The effect of bond rating changes and news ratings on UK stock returns", Journal of Business Finance & Accounting, 24, 497-509.*

[2] *Chen, Guo and Zhang (2006) "Equity Market Volatility and Expected Risk Premium" Research Division Federal Reserve Bank of St. Louis Working Paper Series.*

[3] *Guttler Ander, and Behr Patrick (2005) "The stock market reaction to changes of unsolicited ratings" working paper*

[4] *Guttler André and Wahrenburg Mark (2006) "The Adjustment of credit ratings of defaulted issuers" Journal of Banking and Finance In Press, corrected Proof, Available on line 24 July*

[5] *Hand J, Holthausen R. and Leftwich R.(1992) "The Effect of Bond Rating Agency Announcements on Bond and Stock prices" Journal of Finance, Vol. 47, 733-752.*

[6] *Hilliard and Savicks (2001) "On Stochastic Volatility and More Powerful Parametric Tests of Event Effects on Unsystematic Returns" University of Georgia Athens, GA 30602-6253*

[7] *Pilar Abad (2014) Credit rating agencies and idiosyncratic risk: Is there a linkage? Evidence from the Spanish Market International Review of Economics & Finance Volume 33, September 2014, Pages 152–171.*

[8] *Pynnönen. Seppo (2005) "On regression based event study" Department of Mathematics and Statistics, University of Vaasa*

[9] *Rangel,Gonzalo (2005) "News, annoncements, and stock market volatility dynamics" working paper University of California*

[10] Romero and Fernandez (2006) "Risk and returns around bond rating changes: new evidence from the Spanish stock market" Journal of Business & Accounting vol33- issue 5-6 pp 885-908 July 2006

[11] -Toth and Kertéz (2006) "Increasing market efficiency: evolution of cross-correlation of stock returns" Physica A 360 (2006) 505-515

[12] Vassalou, M., Xing, Y (2005) "Abnormal Equity Returns Following Downgrades" Working Paper, Columbia University.

[13] -Zaima, J.K. and McCarthy, J (1988), "The impact of bond rating changes on common stocks and bonds: Tests of the wealth redistribution hypothesis" The Financial Review, Vol. 23, No. 4, November.

[14] Zumbach, Corsi and Trapletti (2002) "Efficient estimation of volatility using high frequency data" Olsen & Associates Research Institute for Applied Economics Seefeldstrasse 233, 8008 Zurich, Switzerland.

[15] Wakeman, L.M (1990) "The real functiion of bond rating agencies" The Modern Theory of Corporate Finance, 2 ed. Edited by Smith, C. McGaw Hill, New York.

[16] Weinstein.M (1977) "The effect of a rating change announcement on bond price" Journal of Financial Economics Vol 5 pp 329-50.