# The Effect of the Quality of Rumors
# On Market Yields

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## ABSTRACT

During the last decade the world has faced a tremendous development of information technology and telecommunication. This study investigates the impact of rumors (released on the web) on common stock returns. The findings indicate that the market responds positively to rumors. In particular, the impact is stronger for single than for multi rumors and for initial rather than subsequent rumors. Our results may prove useful to financial and portfolio managers by helping them in determining how much weight to place on different types of rumors.

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           and multiple rumors*

# I.      INTRODUCTION

During the last decade the world has witnessed the opening of literally countless websites, chat rooms and forums providing information on financial markets. In most cases opinions, estimates and predictions of investors and private analysts can best be described as merely rumors and not necessarily as objective and reliable information analyzed by experts.

A decade ago most rumors were purely speculative and unreliable nevertheless their effect on stock prices and on abnormal returns was often substantial. Sites deal with rumors of all kinds: true or false (see Spiegel et al., 2010), single or multiple etc. Based on the wealth of data that has become available in recent years we may provide answers to additional questions: How much does each kind of rumor affect abnormal returns prior to the event day (due to a "leakage process"), on the event day, and afterwards. What is the different impact of initial rumors that are later proven to be true and those that have turned out to be untrue? These issues are discussed below where we adopt an event study approach to examine them, based on data sets of the Israeli stock market.

The common well-known approach regarding financial market performance is the Efficient Market Hypothesis (EMH) that states: "Stock prices fully reflect all relevant up-to-date information at any given time". However we find in our empirical study that investors often find opportunities to achieve abnormal returns. Such instances represent an anomaly in the market that contradicts the EMH. In order to prove the existence of such anomalies we use data sets from the most authoritative and important Israeli sites: spouser.co.il, dbursa.com, and trading4living.com, since they are the largest financial gossip and rumor sites in Israel. We focus on published rumors in those sites and investigate their effects on the selected stocks' performance using data sets of events prior to and after the rumor(s) becoming public knowledge.

The latest literature deals with particular rumors transmitted by way of the Internet, as discussed by Werner and Murray (2004). They found that a positive rumor usually leads to a positive return on the following trading day, while a negative message leads to a negative return on the following trading day. Kiymaz (2001) examines good and bad rumors and finds that the good rumors generate abnormal returns beginning four days before their publication, while the effect of negative rumors begins only after publication.

Wysocki (1999) found increasing returns and trade values the day following the rumor, especially when it is published at night while markets are closed. Tumarkin and Whitelaw (2001) examined the influence of Internet financial announcements on stock yields and trade volume by branches based on only one site. Their main conclusion is that we cannot predict volume and yield by branch type.

In this sense we believe that our results are uniquely accurate since we base our analysis and results on data sets that include three different and independent sites for the years 2005-2007, a period during which financial rumors had become very popular and widespread.

In our previous work (Spiegel et al., 2010), we explored the financial market's response to reliable and true information as well as false ones, and its impact on changes in yields before and after the event. Here we continue the investigation by

analyzing and estimating the impact of a single rumor and multiple rumors on yields, as well as the effects of initial and subsequent rumors on those yields.

## II.     SAMPLE DATA

On March 1$^{st}$ 2007 we looked at three sites: Sponsor, The Bursa, and Trading for Living, searching for general rumors concerning various stocks trading on the Israeli stock market.  We selected rumors that predicted higher expected prices than the current market price of those stocks. These kinds of rumors are different from the rumors used by Lerman (2011) who examines rumors regarding items of financial accounts such as balance sheets, or periodic financial reports etc. and their effect on investors. Those we classified as good or optimistic rumors. We use only positive rumors in contrast to a recent work of Tetlock et al. (2008) who analyzed published negative statements about companies and their effect on performance. They used the printed media rather than Internet sites and related to words such as risk or uncertainty that were published in those news media. We checked 1021, 750, and 302 rumors from Sponsor site, Bursa and Trading for Living, respectively, and distinguished between 1227 initial (first time) published rumors that had not been published during the previous 3 months and 846 repeat (subsequent) rumors (472 out of the 846 were repeated at least twice). The rumors appeared in the three sites between January 1, 2005 and March 1, 2007. Daily data are used for all companies in the sample.

The market portfolio index was composed of 958 stocks, where the weight of each stock in the portfolio was determined by its market value divided by the total market value of all 958 stocks. In three respects our sample is unique. First, we used simultaneously three Internet sites making it easier and more accurate to determine that a given rumor is new, based on the dates that they appeared in those three sites. Second, we used a very large sample of more than 2000 rumors.

Finally we used Israelis data that to the best of our knowledge was not used previously by others. Israelis who live under a high degree of risk and uncertainty in an unstable environment are big rumor consumers of all kinds of rumors, including optimistic rumors, and the results below confirm this.

## III.     THE METHODOLOGY OF ABNORMAL RETURNS

To examine the effect of a rumor on a stock's return we adopt the old approach of "event study" also known as Residual Analysis. In the classical literature the gap between the "Actual Return" and the "Normal Return" is defined as Abnormal Return (AR):

$$AR_{it} = R_{it} - \alpha_i - \beta_i R_{mt} - \xi_{it} \qquad (1)$$

where $AR_{it}$ is the abnormal return of stock i in day t, $R_{it}$ is the actual return of stock i in day t, $R_{mt}$ is the return of the market portfolio in period t, $\alpha_i$ and $\beta_i$ are the regression parameters that have to be estimated for each stock, and $\xi_{it}$ is the regression error of stock i at period t.

One of the most popular techniques in analyzing stock behavior and their responses to events or announcements over time is that of tracking both the Average Abnormal Return (AAR) and the Cumulative Average Abnormal Return (CAAR).

$$AAR_t = \frac{1}{N} \sum_{i=1}^{N} AR_{it} \qquad (2)$$

where N represents the number of stocks in the sample.

$$CAAR_{T_1,T_n} = \sum_{t=T_1}^{T_n} AAR_t \qquad (3)$$

The CAAR is the summation of abnormal returns over a given period. The period starts at point $T_1$ where information regarding the site's opening occurs and ends at a time point $T_n$.

## IV.        EMPIRICAL RESULTS

During recent years the use of the Internet has accelerated and today it plays an important role in our daily life as well as in that of the financial markets, and therefore rumors published on the Internet affect investor behavior. In this section we first examine the effect of single rumors versus multiple rumors using the market model.

We study how the number of rumors affects market prices by checking the price fluctuations of 755 companies where only one rumor was published and compare those fluctuations to those of 472 companies with multiple rumors.

Table 1, Table 2, and Figure 1 describe the returns for both kinds of companies (i.e., companies with a history of only one rumor vs. multi-rumor companies) for the sample days of (-29, 30), i.e., 29 days before up until 30 days after the day of the event, based on the market model.

**Table 1**
AAR and CAAR behavior for 755 single rumors

| Time Interval | AAR (%) | PAAR (%) | TAAR | CAAR (%) | TCAAR |
|---|---|---|---|---|---|
| -29,-6 | -0.047 | 46 | -0.125 | -1.119 | -0.613 |
| -5,-1 | 0.795 | 61 | 2.132 | 3.974 | 4.768 |
| -3 | 0.567 | 61 | 1.521 | 0.567 | 1.521 |
| -2 | 0.867 | 70 | 2.327 | 0.867 | 2.327 |
| -1 | 2.124 | 80 | 5.698 | 2.124 | 5.698 |
| 0 | 2.117 | 81 | 5.679 | 2.117 | 5.679 |
| +1 | 0.063 | 51 | 0.169 | 0.063 | 0.169 |
| +1,+30 | -0.126 | 46 | -0.339 | -3.793 | -1.858 |

**Table 2**
AAR and CAAR behavior for 472 multi rumors

| Time Interval | AAR (%) | PAAR (%) | TAAR | CAAR (%) | TCAAR |
|---|---|---|---|---|---|
| -29,-6 | -0.037 | 48 | -0.081 | -0.884 | -0.398 |
| -5,-1 | 0.889 | 64 | 1.961 | 4.443 | 4.384 |
| -3 | 0.933 | 65 | 2.060 | 0.933 | 2.060 |
| -2 | 1.091 | 74 | 2.408 | 1.091 | 2.408 |
| -1 | 2.146 | 76 | 4.736 | 2.146 | 4.736 |
| 0 | 2.555 | 86 | 5.637 | 2.555 | 5.637 |
| +1 | 1.236 | 63 | 2.728 | 1.236 | 2.728 |
| +1,+30 | 0.049 | 43 | 0.109 | 1.476 | 0.594 |

**Figure 1**
The CAAR behavior during the 60-day event window for single vs. multi rumors
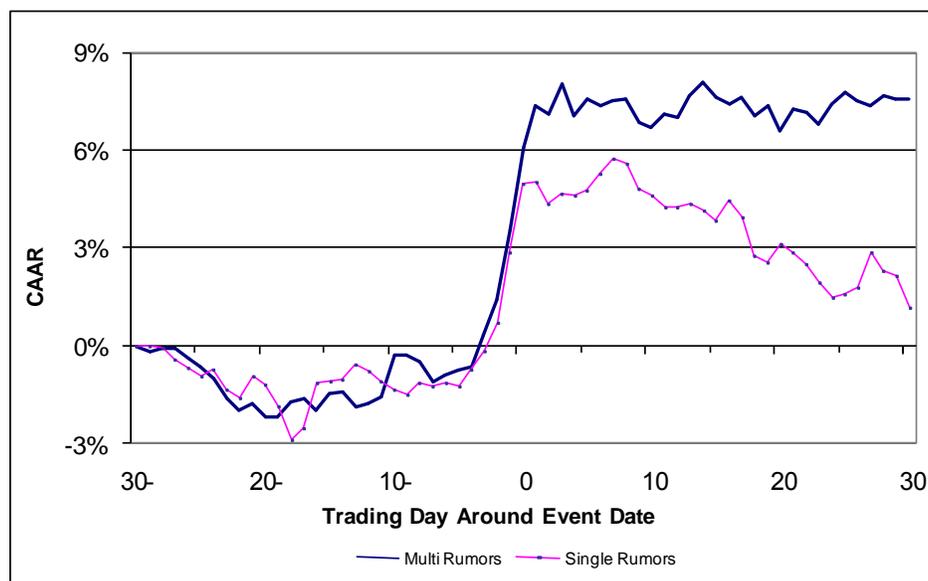


From the data set we see that in the first 24 days the AAR is not significantly different from zero. During the following 5 days before the rumor event the AAR is significantly higher without any significant differences between the one rumor case and the multiple rumor case. This shows that investors can achieve abnormal returns using internal information in both the single and multiple rumors cases.

Prices also continue to rise on the day of the published rumor, and the AAR also increases on the rumor day. The AAR increases for stocks with one rumor by 2.117 (t=5.679) and in the case of multiple rumors by 2.555 (t=5.637). A day later the ARR

continues to increase, in the latter case by an additional 1.236 (t=2.728), while in the single rumor case there is no change on the following day. In our view this indicates the way investors evaluate and differentiate between types of rumors, thus acquiring abnormal returns in the multiple rumors case. These abnormal returns can occur as a result of an additional single rumor that might be published later.  In the following 29 days after the first rumor comes out the CAAR remains more or less constant in the case of multiple rumors, while for the single rumor case CAAR declines. This in our opinion indicates an overreaction of investors to rumors before and after the event, therefore since expectations decline we may expect a reduction in the CAAR.

From the above we can conclude that investors respond significantly over time to multiple rumors since multiple rumors generate expectations for further information. In some sense our results are similar to several recent works such as: Sabherwal et al. (2008) who show the positive effects of quantities of rumors on stocks prices, or the work of Barber and Odean (2008) where they show positive effects of rumors and public adverting on the willingness of investors to buy stocks. On the other hand we find works of Hirshleifer et al. (2008) and Malmendier and Shanthikumar (2007) who claim that information published in several networks had no significant influences on investors' decisions. The second comparison deals with Initial Rumors versus Subsequent Rumors.

The influence of a rumor depends very strongly on its timeliness and content (i.e., whether it contains new information or not). Thus an initial rumor being new and in some cases innovative, may generate a stronger effect than a subsequent rumor, whose influence may be weaker. The comparison between the "initial" rumor and the "subsequent" rumor is discussed in this section for days (-29, +30) based again on the market model.

The results introduced and illustrated in Table 3, Table 4, and Figure 2 are based on 1227 new rumors vs. 472 subsequent rumors that are compared in terms of the returns behavior of CAAR. We find that "initial" rumors were leaked about 5 days before the publicized rumor (4.413) (t=4.889) while the leakage in the case of subsequent rumors occurs about two days before (1.811) (t=2.824). Insiders also respond to initial rumors, since on the day of the rumor AAR increases by 2.354 (t=5.831), while in the case of a subsequent rumor AAR increases by 1.918 (t=4.233).

**Table 3**
AAR and CAAR behavior for 1227 initial rumors

| Time Interval | AAR (%) | PAAR (%) | TAAR | CAAR (%) | TCAAR |
|---|---|---|---|---|---|
| -29,-6 | -0.059 | 47 | -0.147 | -1.426 | -0.721 |
| -5,-1 | 0.883 | 62 | 2.186 | 4.413 | 4.889 |
| -3 | 0.749 | 63 | 1.855 | 0.749 | 1.855 |
| -2 | 0.958 | 71 | 2.373 | 0.958 | 2.373 |
| -1 | 2.135 | 78 | 5.289 | 2.135 | 5.289 |
| 0 | 2.354 | 83 | 5.831 | 2.354 | 5.831 |
| +1 | 0.563 | 55 | 1.395 | 0.563 | 1.395 |
| +1,+30 | -0.046 | 45 | -0.114 | -1.375 | -0.622 |

**Table 4**
AAR and CAAR behavior for 472 subsequent rumors

| Time Interval | AAR (%) | PAAR (%) | TAAR | CAAR (%) | TCAAR |
|---|---|---|---|---|---|
| -29,-6 | -0.009 | 44 | -0.020 | -0.213 | -0.096 |
| -5,-1 | 0.453 | 53 | 0.999 | 2.264 | 2.234 |
| -3 | 0.547 | 56 | 1.206 | 0.547 | 1.206 |
| -2 | 0.899 | 59 | 1.983 | 0.899 | 1.983 |
| -1 | 0.912 | 63 | 2.011 | 0.912 | 2.011 |
| 0 | 1.918 | 68 | 4.233 | 1.918 | 4.233 |
| +1 | -0.887 | 42 | -1.957 | -0.887 | -1.957 |
| +1,+30 | -0.089 | 46 | -0.197 | -2.676 | -1.078 |

**Figure 2**
The CAAR behavior during the 60-day event window for initial vs. subsequent rumors
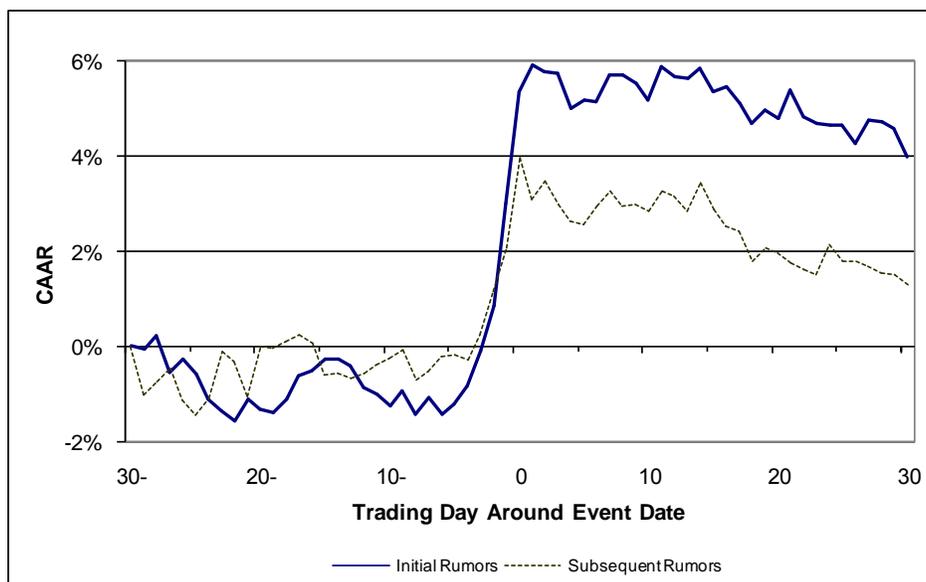


The difference therefore is not significant between the two types of rumors on the day of the event. However, a day after the initial rumor the AAR does not change, while in the other case the AAR is reduced by -0.887 (t=1.957). In the following 29 days no difference can be observed, which indicates that only on the day of the event does the subsequent rumor generate an over-reaction on the part of investors, and therefore a day later price reductions can already be observed. This does not occur in the case of an initial rumor, which means that from the investors' point of view an initial rumor contains more reliable information than a subsequent rumor.

## V.        CONCLUSIONS

In comparing between a many rumors company (a company with more than one rumor concerning a future event relating to the company) and a single rumor company (a company with only one rumor as to a future event) we can say that there is no significant difference between the two cases in the period before the event. This continues to be the case on the day that the rumor enters the domain of general public knowledge. However, the day after the rumor becomes generally known we observe an increase in the AAR for the many rumors case but no change for the single rumor case. This shows that after the rumor is published investors are able to differentiate between the rumors and thereby acquire an abnormal return in the multi-rumor case. A possible explanation for this might be the expectations generated in the minds of investors regarding the possibility that additional rumors might also be published in the future.

Over the next 29 days we see that the CAAR is maintained for the multi-rumor firms but declines for the single rumor firms. The decline of the CAAR for the single rumor firms indicates an overreaction on the part of investors with respect to the period prior to the event as well as a decline in expectations that the rumor will in fact be actualized. We can conclude that over time investors react more strongly in the multi-rumor case due to the expectation of receiving further information in the future.

We also investigated the differences between a first and second rumor. The results show that a first rumor tends to leak five days before the event, while a second rumor started leaking only two days before the event. From this it can be concluded that investors with access to inside information react more vigorously to initial information than to further information that comes later. By comparing the two types of rumors we conclude that the initial or first rumors are of higher quality i.e., contain more new information than subsequent or second rumors.

These results are important and useful for asset holders, as well as for financial and portfolio managers, since it gives them the tools to understand and weigh how the rumors that reach their ears will tend to play out in terms of the possible responses of the investing public. It will also enable them to differentiate between the impacts of multiple vs. single rumors and to take into account the probable immediate price fluctuations that these rumors will cause as well as possible follow up price fluctuations. The money manager will therefore have a good tool for deciding whether to swim with the tide and follow the crowd or whether it might be better to swim upstream against the crowd. Thus the results of our research are interesting both from the theoretical/academic point of view as well as being very useful from a practical point of view.

## REFERENCES

Barber B.M., T. Odean, 2008, "All That Glitters: The Effect of Attention and News on the Buying Behavior of Individual and Institutional Investors", *Review of Financial Studies* 21(2): 785-818.

Hirshleifer, D., J.N. Myers, L.A. Myers, and S.H. Teoh, 2008, "Do Individual Investors Cause Post-Earnings Announcement Drift? Direct Evidence from Personal Trades", *The Accounting Review* 83(6): 1521-1550.

Kiymaz H., 2001, "The Effects of Stock Market Rumors on Stock Prices: Evidence from an Emerging Market", *Journal of Multinational Financial Management*, 11(1), 105-15.

Lerman A., 2011, "Individual Investors' Attention to Accounting Information: Message Board Discussions", *working paper*.

Malmendier, U. and D. Shanthikumar, 2007, "Are Small Investors Naïve about Incentives?" *Journal of Financial Economics,* 85(2): 457-489.

Sabherwal S., S. K. Sarkar, and Y.Zhang, 2008, "Online Talk: Does It Matter?" *Managerial Finance*, 34(6), 423-436.

Spiegel, U., T.Tavor, and J. Templeman, 2010, "The Effects of Rumors on Financial Market Efficiency", *Applied Economics Letters*, 17(15), 1461-1464.

Tetlock, P.C., Saar-Tsechansky, M & Macskassy, S., 2008, "More than Words: Quantifying Language to Measure Firms' Fundamentals", *Journal of Finance,* 63, 1437-1467.

Tumarkin R, and R. F. Whitelaw, 2001, "News or Noise? Internet Message Board Activity and Stock Prices", *Financial Analysts Journal*, 57, 41–51.

Werner A. and F. Murray Z., 2004, "Is All That Talk Just Noise? The Information Content of Internet Stock Message Boards", *Journal of Finance*, 59(3), 1259-94.

Wysocki P., 1999, "Cheap Talk on the Web: The Determinants of Postings on Stock Message Boards", *Working Paper*, University of Michigan Business School, November 1999.