Framing Effects of Cloud Security Announcements on Market Valuation of the Firms

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Abstract

Overview: Security and availability risks have risen to become one of the biggest challenges and concerns for not only firms that are transitioning into the cloud but also firms offering the cloud services. These issues have gained prominence in recent years due the unprecedented growth in adoption and offerings of Cloud computing services. Publicly announcing breaches and countermeasures is one way by which firms manage these issues related to cloud security. Previous studies have shown that information security breaches and countermeasures have a significant impact on the firm's stock price (Gupta et al. 2011). The focus of this paper is to use event study methodology and content analysis to investigate if the impact of firm's stock price due to a cloud security announcement can be explained by the way the announcement articles are framed. In this paper we use text mining to determine framing effects. Our results show that firms which have better stock impact are using stakeholder and security related keywords in their cloud security announcement.

Framing Effects: Framing effect is a phenomenon where a communicator emphasizes or uses certain factors to influence opinions and judgments of readers (Druckman, 2001). Communications studies have widely established that frames in communication (images, words, phrases, etc.) impact the way the information is presented and received. Frames (or keywords) are important to project certain facts or values as important so as to make them salient and thus important to the users (Josyln, 2003). Cooper (2002) asserts that framing of a message is critical in defining problems, attributions and solutions. In our study, we examine the impact of the use of certain frames in cloud security breach announcements on stock price. Such a study can guide the corporate crisis management personnel to ensure that cloud security breach announcements are made using optional frames to maximize the positive impact on the stock market.

Methodology: We used Textexture to find out the most influential frames in our cloud security breach announcement articles. Textexture is an online tool developed by Dmitry Paranyushkin from Nodus Labs. More information on the tool and algorithms it uses can be found in the Textexture website (Paranyushkin, 2012). We merged the 188 cloud security breach announcement articles and used it as input to the Textexture tool. Four most influential contexts in the announcement articles were generated as output. Based on the keywords in the top 4 most influential contexts generated by textexture, we identified the 4 broad themes that dominate the framing of cloud security announcements. Each context was identified as

belonging to the following four themes. 1) business and management, 2) security 3) stakeholders and 4) technology (see table 1). We used these themes to categorize the keywords we obtained from frequency analysis of cloud security announcements which will be discussed in the following section.

Context	Themes
service control services support	Business and management
problem outage delays report	Security
company customer host users	Stakeholders
app server online data	Technology

Table 1: Mapping contexts to themes

Next, we performed a theme-impact analysis to determine the themes that dominate the best performing announcements. We individually collected the impact on stock prices due to each announcement using event study methodology. Eventus® software was used to run 193 outputs with one for each event for the consumer and the provider. These results from the event study were subsequently used for further analysis using content analyses. We used Atlas.ti ® (version 6.0) for content analysis. We obtained 56,214 words with 6226 unique keywords. We removed the keywords that occurred less than 200 times. We then removed the common words like "the", "an", "are" etc. to arrive at 50 keywords which were categorized into four broad themes identified using polysingularity analysis: 1) business and management, 2) stakeholders 3) technology and 4) Security.
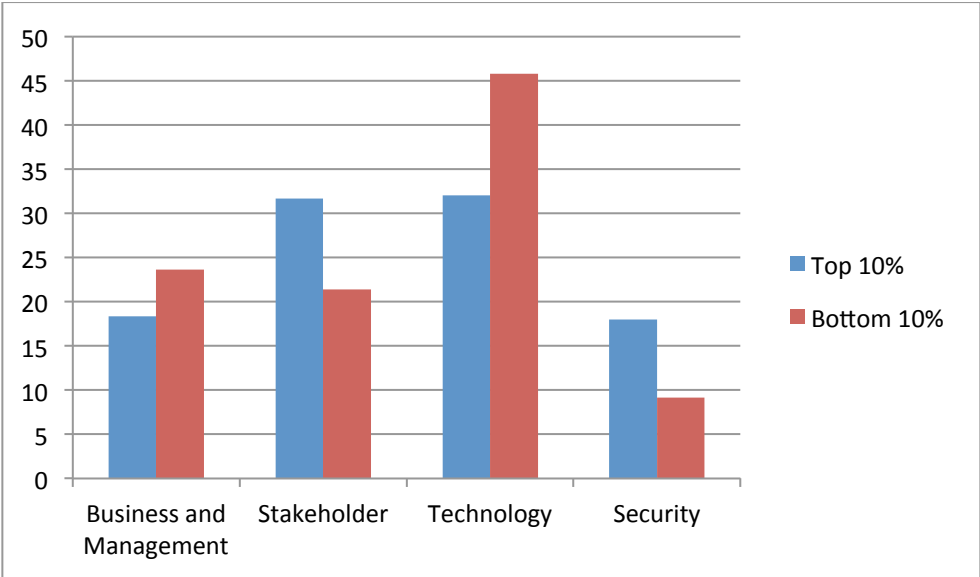

Figure 1: Content analysis: Top 10% vs Bottom 10% performing announcements

The announcements were sorted based on their impact on the stock price of the company involved in the announcement. Figure 1 shows the keywords used in the top 10% and bottom 10% performing announcements. The top 10% used more security-related and stakeholder related keywords, while the last 10% used the more business\management and technology keywords. These observations were confirmed by the results of test of difference in proportion at 5% level of significance.

Conclusion: From our results, we can infer that investors foresee future profitability of the company when stakeholder and security related keywords are used. Our content analysis can be used to cue managers on the keywords that responded more positively when a cloud security announcement is made. The study also sheds light on the type of keywords that must be avoided while framing cloud security breach announcements.

References:

1. Gupta, M. (2011). Three essays on information technology security management in organizations. Ph.D. dissertation, State University of New York at Buffalo, United States -- New York. Retrieved January 4, 2012, from Dissertations & Theses @ SUNY Buffalo.(Publication No. AAT 3440288).
2. Druckman, J. N. (2001). The implications of framing effects for citizen competence. Political Behavior, *23*(3), 225-256.
3. Cooper, A. H. (2002). Media framing and social movement mobilization: German peace protest against INF missiles, the Gulf War, and NATO peace enforcement in Bosnia. European Journal of Political Research, 41(1), 37-80.
4. Joslyn, M. R. (2003). Framing the Lewinsky Affair: Third-Person Judgments by Scandal Frame. Political Psychology, *24*(4), 829-844
5. Paranyushkin, D. (2012). Visualize any text as a network - Textexture. Retrieved November 18, 2012, from http://www.textexture.com/index.php.