Are individual investors influenced by the optimism and credibility of stock spam recommendations?

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Abstract

This study examines attention-driven investment decisions using a sample of firms essentially unknown to investors prior to becoming the target of a stock spam campaign. We show that the market reaction to spam varies predictably with the content of the spam message. Spam date returns and volume are significantly higher for stocks targeted by spam emails containing optimistic target price projections bundled with ostensibly credible information quoted from a previously issued company press release. There is also some evidence that disclaimers in spam messages reduce, but do not eliminate, the market response. Attention effects also contribute to spammers’ selection of stocks to target and to spam-related enforcement actions by the Securities and Exchange Commission.

Key Words: Investor attention; Stock spam; Target prices; Press releases

JEL Descriptors: G11; G12; G14
1. Introduction

Research suggests that investors have limited attention. They consider purchasing only those stocks that have first caught their attention (Barber and Odean, 2008), and even then may not adequately process information about this set, such as strategic incentives to manipulate investor perceptions (Hirshleifer and Teoh, 2003). This study examines the effects of limits to investor attention and processing using a sample of firms that exist in relative anonymity until becoming the target of a mass email stock spam campaign touting the stock’s investment potential.

In several respects, stock spam provides a natural quasi-experimental setting to examine investor attention. First, the microcap stocks targeted by stock spam are unlikely to garner attention under ordinary circumstances. Prior studies focus on larger firms that already attract a fair amount of attention, making it difficult to isolate the incremental attention given to new events or information (e.g., Grullon et al., 2004; Hirshleifer et al., 2004; Barber and Odean, 2008; Engelberg et al., 2010). Second, stock spam is aimed at individual investors who exhibit limited attention to a greater extent than institutional or professional investors (e.g., Frederickson and Miller, 2004; Grullon et al., 2004; Elliott, 2006; Barber and Odean, 2008). Finally, the content of spam messages varies considerably, providing an opportunity to assess how specific information attributes, including optimism and credibility, affect investor attention. In contrast, prior studies rely on relatively coarse proxies of attention, such as trading volume, extreme returns, or the existence of a news story.

The goal of a stock spam scheme is to increase demand for the targeted company’s stock by widely disseminating emails suggesting a huge increase in share price is imminent. Once the spammer liquidates his/her position at an inflated price and stops hyping the stock, the price
typically falls and investors lose their money. On average, spam temporarily increases share prices and trading volume of targeted stocks (Böhme and Holz, 2006; Frieder and Zittrain, 2007; Hanke and Hauser, 2008).  

Our objective in this paper is to leverage the stock spam setting to further our knowledge of how individual investors with limited attention and processing power respond to information. Drawing from research on anchoring behavior (e.g., Tversky and Kahneman, 1974), we predict that investors will anchor on target prices in spam messages, increasing trading in those stocks and driving share prices towards the target. We also expect an increased market response to messages quoting information from a previously issued company press release, as investors have a tendency to react to news even when it is stale (Huberman and Regev, 2001; Tetlock, 2011) and to online message board activity even in the absence of information events (Sabherwal et al., 2011). Moreover, investors have difficulty adjusting for optimistic bias (Ackert et al., 2004) and exhibit greater reliance on optimistic statements when combined with credible information (Hodge, 2001; Hutton et al., 2003), suggesting that the market response to bundling a target price projection with credible information from a press release will be greater than the response to either feature in isolation. Finally, we expect that investors will not pay adequate attention to disclaimers included at the end of some spam messages because information that is not displayed prominently is perceived as less important (e.g., Bouwman, 1982; Hunton and McEwen, 1997). Similarly, Louis and Sun (2010) show that investors are less attentive to merger announcements that are less prominent (i.e., announced on Friday as opposed to Monday). Moreover, people

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1 Given the negative public opinion of spam, it might seem that these unsolicited email messages would be summarily dismissed by the recipient. Prior research suggests, however, that some investors trade in stocks with lottery-type features as a form of gambling (e.g., Friedman and Savage, 1948; Markowitz, 1952; Statman, 2002; Barberis and Huang, 2008; Kumar, 2009; Green and Hwang, 2009). In particular, Kumar (2009) shows that individual investors exhibit a strong preference for lottery-type stocks; in other words, low priced stocks with a very small chance of a large payoff. These “cheap bets” are the type of stocks targeted by spam schemes.
generally fail to adjust fully for the misaligned incentives of a biased advisor (Cain et al., 2005; Malmendier and Shanthikumar, 2007). Thus, we expect a disclaimer in the spam message to reduce but not eliminate the market reaction to spam.

To conduct our empirical tests, we extract and analyze 639 unique spam events from internet archives of spam messages between January, 1999 and May, 2006. We show that investors do not naively trade in response to all spam, but rather discriminate based on the content of the message. Investors appear to ignore spam messages that are nothing more than vague puffery, but are insufficiently skeptical of messages containing optimistic target price projections bundled with ostensibly credible information quoted from a previously issued company press release. Investors are not entirely dissuaded from trading even when the spam message discloses potential conflicts of interest or otherwise disclaims responsibility.

Specifically, results of univariate tests show that mean raw returns in one- to three-day windows around the spam event are reliably positive for spam messages containing a target price. Old press release information has little effect in isolation, but the combination of a target price and press release generally produces higher mean and median returns than for either attribute individually. Spam messages that include neither attribute generate little to no response from investors. Finally, a disclaimer in the spam message lowers the mean return, although the response remains significant.

Regression results reveal that investors respond not only to the presence of a target price, but also to the magnitude of the return implied by that target price. Returns and volume are significantly positively associated with the implied return for spam messages also containing old press release information. In contrast, the market response to implied returns is insignificant for spam messages that do not quote a press release. These results are robust to controls for other
proxies for investor attention, including abnormal volume and the number of duplicate messages sent for each spam event, and to alternative return and volume measures. Results regarding disclaimers in spam messages are less conclusive; the coefficient estimate on this indicator variable is negative, as predicted, but is not statistically significant in all specifications.

In sensitivity analysis, we find that the market response to the implied return is nonlinear; investors trade less as the touts become excessively optimistic. Our sensitivity tests also show that the insignificant response to press release information repeated in spam messages is not because the information is irrelevant. In fact, we document a significant returns and volume reaction around the original issuance of the press release. Rather, at the spam date, investors appear to use the press release information as substantiation for the touted target price.

In additional tests, we provide evidence on the determinants of stocks targeted by spam. Compared to two control samples consisting of (i) random non-spam dates for our spam sample and (ii) random dates for a sample of non-spammed OTC Bulletin Board and Pink Sheets stocks, we find that spammers target attention-grabbing stocks with relatively low transaction costs. We also investigate the determinants of stock spam schemes targeted by Securities and Exchange Commission (SEC) enforcement actions. We find that the likelihood of SEC intervention is increasing in the spam date return and the duration of the scheme, but is decreasing in the optimism of target price projections bundled with press release information and the inclusion of a disclaimer. Because these attributes are often the hallmarks of sophisticated spam schemes, these latter results suggest that the SEC does not necessarily pursue the type of schemes to which investors are most vulnerable.

This study provides one of the most detailed investigations of investor attention to date. We present direct evidence on limits to how extensively and effectively individuals use different
kinds of information in making investing decisions. Our study also complements and extends recent work on the information environment of small publicly-traded firms. For example, Bushee and Leuz (2005) examine the cost-benefit trade-off of disclosure regulation for OTC Bulletin Board firms, while Bushee and Miller (2009) provide evidence on the effects on small firms of initiating an investor relations program. We focus on how misinformation spread by unscrupulous spammers affects investors’ decision-making in this environment. In this regard, our study also provides findings useful to the SEC in their on-going efforts to protect investors from internet investment scams.

The remainder of the paper proceeds as follows. Section 2 examines the economics of stock spam. We develop our empirical predictions in Section 3. Section 4 describes the data. Section 5 presents our main empirical tests. Section 6 provides additional evidence on the types of stocks targeted by spam and the determinants of SEC enforcement. Section 7 concludes.

2. Economics of Stock Spam

To provide insights into the motivations for operating a stock spam scheme and the costs and benefits involved, we analyze spam-related SEC enforcement actions. Because of increasing investor protection concerns, the SEC in 1998 filed its first stock spam-related securities fraud charges. Subsequent enforcement sweeps periodically resulted in additional charges, including most recently “Operation Spamalot” in March 2007.

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2 In a related vein, prior research uses SEC Accounting and Auditing Enforcement Releases (AAERs) to analyze types of earnings manipulation schemes, motivations for earnings manipulation, and penalties assessed by the SEC (e.g., Feroz, Park, and Pastena 1991; Dechow, Sloan, and Sweeney 1996; Beasley 1996; Beneish 1997; Bonner, Palmrose, and Young 1998). Similar to the AAERs investigated in these studies, the sample of spam-related enforcement actions likely is biased toward more egregious cases of stock spam fraud. We provide evidence on features of spam schemes that are likely to trigger an enforcement action by the SEC in Section 6.

To identify spam-related enforcement activities, we search the SEC website for all litigation releases containing the word “spam.” This search yields 204 documents. Of this total, 25 are not related to stock spam or do not involve a publicly-traded company and 95 are updates to previous litigation releases, resulting in 84 unique stock spam-related enforcement actions involving publicly-traded stocks spammed from 1997 through 2008. Each enforcement action typically involves several defendants who had targeted one or more companies as part of the spam scheme.

As shown in Table 1, Panel A, we classify the type of spam scheme into two mutually exclusive categories. Management Collusion schemes occur when management of the targeted company is involved in the operation of the spam scheme, typically as a means of generating short-term liquidity and price increases that enable them to cash out some of their equity in the company. Most SEC enforcement actions (67 of 84, or 80 percent) involve management collusion. It is important to note, however, that this finding does not necessarily indicate that management is involved in most stock spam schemes; rather, cases involving management are likely easier for the SEC to prosecute. The remaining schemes in the SEC sample are Boiler Room operations in which the spammer acts without management involvement, acquiring shares of microcap companies before sending spam messages hyping the stock, and then unloading the shares. Because these “pump and dump” schemes typically require the spammer to cover round-trip transaction costs in fairly illiquid stocks, the spam messages in these schemes need to generate a huge price increase for the spammer to realize a profit.  

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4 In addition to these profit-motivated schemes, it is possible that stock spam messages might be sent for “entertainment” value (e.g., simply to see if the market will react). The expected costs of this type of spam scheme are essentially zero as the spammer is unlikely to invest any time or resources in crafting a detailed spam message or suffer any legal consequences. We do not observe any such schemes in the SEC sample.
Table 1, Panel A also reports the frequency of three spam scheme characteristics discussed in the SEC complaints. First, a Paid Promoter is used to facilitate 42 (or 50 percent) of the stock spam schemes. Compensation for this service often includes shares of the targeted company’s stock; consequently, Paid Promoters can earn trading profits when the scheme generates sufficient liquidity to cash out the shares they hold, with those profits increasing in the magnitude of the short-term price bump. To avoid detection, Paid Promoters generally use pseudonyms; in one case, the spammer operated under at least thirty different identities. Second, in 45 (or 54 percent) of the spam schemes, the spammer issues at least one fraudulent press release (Press Release Fraud) prior to initiating the spam campaign. The spammer then includes part or all of the fraudulent press release in the spam message to bolster the optimistic claims about the targeted stock. Finally, in 24 (or 29 percent) of the schemes the spam message includes an explicit Target Price projection for the targeted stock.

Examining these characteristics by type of spam scheme reveals that Management Collusion schemes tend to be fairly sophisticated, with approximately two-thirds of these schemes involving a Paid Promoter or Press Release Fraud, and one-third involving a Target Price projection. In contrast, Boiler Room operations almost never involve a Paid Promoter or Press Release Fraud, likely because of the additional costs involved and the difficulties an outsider would encounter in issuing a company press release through an official newswire service. Boiler Room operations, however, do utilize Target Price projections at nearly the same

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5 These paid promoters are distinct from legitimate investor relations firms that small companies sometimes engage to improve visibility and long-term investor following (see, for example, Bushee and Miller 2009).
6 For a random sample of enforcement actions with detailed information on the fraudulent press releases, we locate the originally issued press release. In all cases, these fraudulent press releases are virtually indistinguishable from valid press releases in form and presentation. Moreover, they are released through an official newswire service and are included in the LexisNexis and Factiva databases.
rate as in *Management Collusion* schemes, as this is likely a cost-effective way for these spammers to attract investors’ attention.

Table 1, Panel B reports *compensation paid* (for cases involving a *Paid Promoter*), *trading profits*, and *monetary penalties* assessed by the SEC. The enforcement actions report these data as aggregates for all defendants and targeted stocks in each spam scheme. In 20 of the 34 cases where the SEC discusses the amount of compensation paid, they also disclose the amount. For these cases, median *cash (share) compensation* is $180,000 (500,000 shares). Total *trading profits* vary from $8,200 to over $37 million, with a median slightly greater than $800,000. It is important to note, however, that spammers’ profits may be only a fraction of aggregate investor losses. For example, in one case, the SEC indicates that the spammer profited only $40,000 but caused over $1 million in investor losses. The amount of *civil penalties* assessed by the SEC (in excess of the disgorgement of profits and interest) is disclosed in 18 of the 31 cases where penalties are discussed, and varies from $12,567 to $3,700,000, with a median of $120,000.

The correlation matrix presented in Table 1, Panel C reveals that the most elaborate and successful schemes involve management of the targeted company. *Management collusion* is significantly positively associated with the use of a *paid promoter, press release fraud*, and *trading profits*. The use of a *target price* is significantly positively correlated with *cash compensation* and *trading profits*. Finally, *civil penalties* are significantly positively correlated, at the 0.10 level, with *trading profits*.

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7 Most often, cases are settled out of court with no admission of guilt. Spammers are typically ordered to disgorge profits, pay interest and penalties, and are frequently barred from serving as an officer or director or participating in an offering of penny stocks. In a few cases, spammers are sentenced to time in prison.

8 Because *Management Collusion* and *Boiler Room* are mutually exclusive schemes, we only tabulate correlations for the former. The correlations for boiler room operations are of opposite signs but equal to those of the management collusion schemes.
To summarize, the primary motive for engaging in a spam scheme is to generate a profit from selling shares in the targeted company. In schemes involving management collusion or paid promoters, shares are already held or are received as compensation, allowing these parties to profit from an increase in liquidity even if the price does not increase substantially. In boiler room operations, the spammer must first acquire shares, and thus risks financial loss if the scheme does not generate a large increase in price. Spammers thus have incentives to increase both price and volume, although their ability to do so may vary.

Managers, acting alone or with a paid promoter, have greater access to legitimate information about their company as well as the ability to issue fraudulent press releases through the newswires. Thus, spam emails generated in these schemes likely contain not only hype about the targeted stock’s prospects, but also supporting information that appears credible. In contrast, schemes conducted by company outsiders likely rely to a greater extent on claims about the stock’s profit potential but little concrete information. These boiler room operations generate lower trading profits for spammers, but are less likely to trigger regulatory penalties. In the section that follows, we build on the insights from our analysis of spam-related SEC enforcement actions and the findings of prior research to develop testable predictions regarding how the content of spam messages affects investors’ response.

3. Empirical Predictions

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9 In fact, in 10% of SEC enforcement actions, including both management collusion and boiler room schemes, the spammers engaged in "wash sales" to create the appearance of liquidity.

10 Although we do not have access to the spam emails for all schemes subject to an enforcement action, 35 of the targeted companies in our spam sample (discussed later in Section 4) are also identified in an SEC enforcement action, 21 involving management collusion and 14 boiler room operations. Consistent with more sophisticated messages in schemes involving management, untabulated analysis of the spam messages for these companies reveals that 85% (41%) of messages in a management collusion scheme contain a press release (target price projection) compared to 71% (21%) in a boiler room scheme.
Our purpose in this paper is to provide evidence on what prompts trading in stocks touted by spam email messages. Because spammers target microcap stocks, buyers are almost certainly individuals whose response to information is likely to be limited or naive. For example, prior research documents that individuals are especially prone to attention-driven buying in response to a variety of stimuli, including published news stories (e.g., Barber and Odean, 2008; Tetlock, 2011), firms’ product market advertising (Grullon et al., 2004), and recommendations on the investment show Mad Money (Engelberg et al., 2010). These studies examine relatively large companies promoted via credible media channels. Unsolicited spam emails touting microcap stocks are likely to be greeted with substantially more skepticism. For this reason, the mere receipt of a spam email, while drawing attention to a previously unknown stock, may not be enough to prompt a significant investor response. Therefore, we focus our predictions on specific attributes of spam messages that are likely to solicit a response from investors.

The key element of a stock spam scheme is the suggestion that the targeted stock is poised to experience a huge increase in share price, generating sizeable profits for investors who buy on the spammers’ advice. Although this message can be conveyed in general terms, some spam messages also quote an explicit target price for the company’s shares. Research on anchoring shows that judgments are often drawn towards salient numerical reference points (the anchors), even when those anchors are known to be irrelevant (Tversky and Kahneman, 1974), implausible (Strack and Mussweiler, 1997), or manipulative (Galinsky and Mussweiler, 2001; Hastie et al., 1999). Thus, we expect investors to anchor on target prices, increasing trading in those stocks and driving share prices towards the target.

Spammers can also bolster their basic message by quoting information extracted from a previously issued company press release to support their claims. Prior research shows that
investors react to the re-publication of obscure but publicly available information (Huberman and Regev, 2001). Individual investors in particular are net buyers of stocks in the news (Barber and Odean, 2008), reacting even when the news is stale (Tetlock, 2011). Thus, we expect the market response to be greater for spam messages that quote a previously issued press release.\footnote{As noted above in our analysis of SEC enforcement actions, some press releases quoted in spam messages may be fraudulent. Although the information is false, the form and presentation mimic valid press releases. To the extent investors are able to discern fraudulent press releases in spam messages, this will bias against finding results consistent with our prediction.}

Finally, prior research shows that investors are more likely to rely on optimistic statements when packaged with credible information. For example, the market reaction is greater for good news management earnings forecasts accompanied by verifiable information (Hutton et al., 2003) and for optimistic unaudited information hyperlinked to audited financial statements (Hodge, 2001). Thus, we expect the market response to be greater for spam emails that include both a target price and information quoted from a company press release.

Although the purpose of spam is to hype targeted stocks, spam messages also often contain a disclaimer section disclosing compensation received by the spammer for sending the email or cautioning the reader about the risks of investing in the stock. Spammers likely include these disclaimers to reduce the possibility of SEC action. Findings from prior research, however, suggest that people may discount or even ignore these warnings. The disclaimers are invariably placed at the end of the message in a small font. Because non-professional investors sequentially process information in the order it is presented, information that is displayed prominently in a headline or initial paragraph is perceived as being more important than information which is less prominent (Bouwman, 1982; Hunton and McEwen, 1997). For example, the relative positioning of pro forma and GAAP earnings in press releases influences investors’ judgments of the importance of these firm performance measures, particularly for small investors (Frederickson
and Miller, 2004; Elliot, 2006; Bowen et al., 2005). Moreover, people generally do not adequately discount the recommendations of a biased advisor even when the conflict of interest is disclosed (Cain et al., 2005; Malmendier and Shanthikumar, 2007). For these reasons, we expect the inclusion of a disclaimer in spam emails to reduce the market reaction but not eliminate it entirely.

4. Data and Descriptive Statistics

(i) Spam Sample

We obtain spam messages from two internet sources which archive spam sent to both personal email addresses and to email addresses created specifically for the purpose of attracting spam. The first archive (www.annexia.org) includes spam sent during 1997–2004 and the second (www.crummy.com) during 2005–06. Because these archives also include non-stock spam messages, we search the full text of each spam message for words commonly included in stock spam, such as “OTC,” “Pink Sheets,” “strong buy,” and “undervalued,” among others. This procedure identifies a sample of stock spam from January, 1999 through May, 2006.

Spam messages received within a short period of time are generally duplicates of other spam messages sent during the same short window. Accordingly, we identify each unique spam and count the number of duplicate messages. If more than one unique spam for a given target company occurs within a seven day period, we exclude all but the first unique spam. In all analyses, we use the date of the first spam message received as the spam date (day 0) for each unique spam event.
As shown in Table 2, Panel A, our final sample consists of 639 unique spam messages for 423 targeted companies. The number of unique spam messages (target companies) increases dramatically over the sample period, from 40 (35) during 1999–2001, 135 (100) during 2002–04, and finally 464 (307) during the final two years of the sample period, 2005–06. Untabulated findings reveal a similar increase in the number of duplicate spam messages associated with each spam event, from a mean (median) of 1.6 (1.0) during 1999–2001, 7.36 (1.0) during 2002–04, and 37.4 (9.0) during 2005–06. Not surprisingly, most of the targeted companies trade on the Pink Sheets (53.52 percent) or the OTC Bulletin Board (44.91 percent).

(ii) Attributes of the Spam Sample

The content of stock spam messages varies considerably, as illustrated by the representative examples in the Appendix. The first spam targeting New Millennium Media is brief, with little information about the company and several “puffing” statements implying the spammer has private information about future company sales and contractual developments that are projected to increase trading volume and share price. The spammer quotes a target price of $2.00 when shares in this company were trading at $0.42.

The second spam targeting Digilava Inc. is fairly sensational in format and tone, but also contains some factual background information on the company. An interesting feature of this spam is that it embeds a prior press release from the targeted company, stating that Digilava

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12 Although there is no single comprehensive source of stock spam emails, our sample appears to be reasonably representative based on a comparison to two independent sources. First, our sample includes approximately 30% of the targeted companies identified in the SEC enforcement actions discussed above during 2002-2006 and 7% during 1999-2001. Because the small firms targeted by spammers tend to experience frequent ticker changes, it is more difficult to identify a match in the earlier years. Second, Spamnation (http://spamnation.info) reports spam activity for 63% of our sample. This source also identifies spam activity for an additional 459 companies, but we are unable to include these events in our sample because Spamnation does not archive the text of the spam message.

13 Our sample is not dissimilar to the Bushee and Miller (2009) sample of 210 small and mid-cap firms listed primarily on the OTC Bulletin Board. The focus of that paper, however, is on small firms initiating legitimate investor relations campaigns to increase visibility and build long-run investor following, whereas we examine small firms targeted by stock spam campaigns.
“today announced that the Company has executed a Letter of Intent” to acquire a strategic
government. No mention is made of the fact that the original announcement occurred in a press
release on March 9, 2004, even though the spam was first sent on March 11, 2004. This spam
message also includes a disclaimer regarding the risks of investment, but further indicates that
the spammer may “own, buy, or sell any securities mentioned at any time,” and was paid
$12,350 from an unidentified third party to send the message.

The final spam targeting eUniverse resembles an analyst research report, with select
financial statement data, summary bullet points highlighting company developments, a
description of the company, a fundamental valuation analysis, and a target stock price well above
the 52-week price range. The spam message also includes a disclaimer acknowledging the risks
of investing in eUniverse, and directs the reader to the company’s SEC filings for more
information concerning these risks. Finally, the spam message discloses that the spammer was
not hired and did not receive any compensation from or on behalf of eUniverse.

To test our empirical predictions, we manually code relevant features of each unique spam message. We present summary descriptive information for these characteristics in Table 2,
Panel A. The majority of the spam messages include information from a previously issued press
release. Specifically, in the pooled sample 74 percent of spam messages include quoted press
release information either attributed to the targeted company or without specifically identifying
the source. The practice of quoting a press release has increased over time, from 55 percent of
spam messages in 1999–2001 to 66 percent in 2002–04, and finally to 78 percent in 2005–06
(significant at the 0.01 level). Untabulated results show that this increase is driven by spam
messages directly quoting press releases attributed to the targeted company. We are able to
verify the existence of most of the press releases by locating the original announcement posted
on LexisNexis or Factiva. These press releases therefore appear legitimate, although our analysis of SEC enforcement actions suggests it is likely that at least some were issued fraudulently by conspirators in the spam scheme. Because legitimate and fraudulent press releases are \textit{ex ante} indistinguishable, however, the inclusion of the press release likely heightens the perceived credibility of the spam message.

Most spam messages contain a separate \textit{disclaimer} section, which is generally at the end of the message in small font. Approximately two-thirds of the sample include \textit{safe harbor language} consistent with the provisions of the Private Securities Litigation Reform Act of 1995 cautioning that forward-looking statements in the spam message may not be realized. An example of this language is shown in the Digilava spam message reproduced in the Appendix. The use of safe harbor cautionary language increased significantly between 1999–2001 and 2002–04, before leveling off in the last two years of the sample period. A smaller proportion (14 percent) of sample spam messages contain a generic disclaimer, and these were more common in the early years of the sample period.

Many spam messages also disclose compensation received in the disclaimer section, either cash (46 percent) or equity in the targeted company (14 percent). The proportion of spam messages disclosing monetary compensation doubled between 1999–2001 and 2002–04, although the median dollar amount remained relatively constant.\textsuperscript{14} The disclaimer section also frequently includes the name of the party responsible for sending the message. This disclosure, however, has become significantly less common in recent years, and based on our analysis of SEC enforcement actions above, it is likely that the disclosed information is a pseudonym.

\textsuperscript{14} The median dollar amount of cash compensation self-reported by the spammer in the spam messages in our sample (approximately $10,000) is substantially smaller than the amount reported in the SEC enforcement actions ($180,000 per Table 1). The median number of shares received, however, is the same (500,000) in the two samples.
Finally, 71 percent of sample spam messages include the current share price of the targeted company, while 41 percent include a target share price. Table 2, Panel B provides additional information on these amounts and the related implied return. There are 236 unique spam messages containing both a target share price and a current price. Target prices greatly exceed current share prices, as evidenced by a mean (median) implied return of 517 percent (256 percent). By most standards, these implied returns appear excessive. For example, Brav and Lehavy (2003) report that even for stocks rated a "strong buy," analysts’ target prices exceed current stock prices by 41 percent, on average. Of course, transaction costs for the illiquid stocks targeted by stock spam are also high, and thus the extreme target prices may be an attempt by the spammer to drive up share prices sufficiently to realize a profit.

To examine the reasonableness of the target prices touted in spam emails, we plot implied returns relative to realized returns six-months following the spam message. Figure 1, Panel A shows that the univariate distributions of realized and implied returns are almost entirely non-overlapping. Realized returns are predominately negative while implied returns are uniformly positive. Moreover, the bivariate distribution in Panel B reveals only one observation with a realized return above the implied return. Realized returns calculated using the highest closing price at any point during the six months following the spam message exceed implied returns for only 10 stocks, or 4 percent of the target price sample (untabulated). Thus, buying in response to the exorbitant returns implied by the target prices contained in spam emails rarely delivers the touted return and, in fact, is almost always a losing proposition for investors.

5. Market response to spam

We examine both returns and trading volume of targeted stocks around spam events for evidence of a market reaction to spam. Table 3, Panel A, presents information on the distribution
of raw returns for the sample of 639 unique spam messages in our sample. The mean return in
the 3-day window (−1,1) surrounding the spam date is a positive and significant 8 percent,
followed by a statistically significant reversal from day 0 through day 10. The median return,
however, is not statistically different from zero except in the event windows extending at least 5
days after the spam date, where the returns are significantly negative. These results indicate that
spam does not produce positive returns for most targeted stocks. In fact, on the spam event date,
positive and negative returns occur with equal frequency.

Table 3, Panel B presents results for abnormal trading volume, defined as volume on a
given day divided by the median volume for the targeted stock over the window (−20, −2).
Values greater (less) than one indicate abnormally high (low) trading activity. The results show
that median volume is nearly three times the usual level on days 0 and +1 before beginning to
decline to more normal levels.15

The analysis in Table 3, Panel A uses raw returns because there is no suitable market
index for our sample.16 In general, however, research finds that raw returns approximate
abnormal returns over short windows (e.g., Trueman et al., 2003; Huddart et al., 2007; Altinkılıç
and Hansen, 2009). Nevertheless, to provide a benchmark for our results, we estimate the
distribution of returns for sample firms on randomly selected non-spam dates. Specifically, for
each unique spam message, we randomly select one event date (day 0) preceding and one
following the spam date, excluding the 30 days surrounding the spam date. Untabulated findings
show that mean and median returns are insignificantly different from zero in the three-day

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15 We do not find evidence of insider trading activity being reported to the SEC around spam dates for the OTC
Bulletin Board firms in our sample (firms trading on the Pink Sheets are not required to file with the SEC). Although
our analysis of spam-related SEC enforcement actions (see Section 2) reveals that insiders are often involved in
spam schemes, it is not surprising that managers perpetrating such schemes fail to report insider trading.
16 Market indices such as the Russell 2000 Index or the Russell Microcap Index exclude stocks traded on the OTC
Bulletin Board and Pink Sheets because of their failure to meet national exchange listing requirements.
window surrounding the random events, with a lower proportion of positive returns than for the spam event dates reported in Table 3. Moreover, there is no evidence of unusual trading activity as the abnormal volume measure is close to one.

Taken together, the results in Table 3 suggest that stock spam generally improves the liquidity of targeted stocks. Although spam shifts the distribution of returns slightly to the right, as evidenced by the positive mean returns, it does not generate positive returns for the majority of targeted companies.

(i) Spam Characteristics and the Market Response to Spam

To examine how specific determinants affect investors’ reaction to spam messages, Table 4 reports returns for the sample partitioned on whether the spam message includes a target price (Panel A), a press release (Panel B), or both a press release and a target price (Panel C). We expect the market response to be greater for spam messages containing these elements, particularly in combination. We also partition the sample on whether the spam message contains a disclaimer (Panel D), which we expect to mitigate the market response.

Consistent with predictions, Table 4, Panel A shows that returns are higher for spam messages that include a target price. In all event windows, mean returns are more than three times higher for the target price sample (between 7 percent and 14 percent) compared to the sample without target prices (between 1 percent and 4 percent). Moreover, median returns are also significantly positive (between 1 percent and 3 percent) for spam messages containing a target price. We investigate whether the magnitude of the return implied by the target share price is associated with the market reaction in the regression analyses reported below.

In contrast to these findings, Panel B shows that including an old press release in the spam message has little effect on returns. Although the mean return in the one-day event window
(0,0) is higher for the press release sample (4 percent) than the no press release sample (3 percent), this is not the case in either the two-day (0,1) or three-day (−1,1) windows. Moreover, in all three event windows, median returns are zero whether or not a press release is included. Thus, quoting a press release in the spam message does not by itself trigger a market response.

Because spam messages often include press release information along with target prices, we sort the sample based on both attributes and present the results in Panel C. Consistent with the above results, returns are higher when a target price is included in the spam message while there is only weak evidence of a press release effect, suggesting that target prices are the primary factor driving the market response. Moreover, as expected, the findings show that the combination of a target price and press release generally produces the highest mean (between 9 percent and 13 percent) and median (3 percent) returns. Spam messages that include neither of these information attributes generate essentially no response from investors.

Finally, Panel D shows that mean returns are lower for spam messages that include a disclaimer (between 3 percent and 6 percent) than those without such warnings (between 7 percent and 18 percent), consistent with disclaimers curbing the reaction to the spam. It is important to note, however, that even with a disclaimer there is a significant mean reaction to spam, in line with prior research suggesting that people do not adequately consider such disclosures in their decisions (e.g., Cain et al., 2005; Malmendier and Shanthikumar, 2007).17

(ii) Multivariate Regressions

To further test the market reaction to spam, we model spam date returns and volume as a function of the message content:

\[ Return = \alpha_0 + \alpha_1 \text{Press} + \alpha_2 \text{Implied Return\_No Press} + \alpha_3 \text{Implied Return\_Press} \]

\[^{17}\text{Inferences based on abnormal volume are consistent with the returns analyses in Table 4. Specifically, mean and median abnormal volume is generally higher (lower) in response to spam messages including both a target price and press release (disclaimer).}\]
\[ + \alpha_4 \text{Disclaim} + \alpha_5 \text{Abnormal Volume} + \alpha_6 \text{Spam Frequency} + \varepsilon \quad (1) \]

\[
\text{Volume} = \alpha_0 + \alpha_1 \text{Press} + \alpha_2 \text{Implied Return}_\text{No Press} + \alpha_3 \text{Implied Return}_\text{Press} \\
+ \alpha_4 \text{Disclaim} + \alpha_5 \text{Lagged Volume} + \alpha_6 \text{Spam Frequency} + \varepsilon \quad (2)
\]

We estimate the regressions using two alternate measures for each of the dependent variables. In equation (1), \textit{Return} is either the raw return on day 0 or the midpoint return, computed using the average of high and low prices. Returns calculated using transaction prices can be biased upwards due to bid-ask bounce; the larger the bid-ask spread, the larger the potential bias (Blume and Stambaugh, 1983). This is a potential concern for our sample of relatively illiquid stocks that likely have large spreads.\[^{18}\] In equation (2), \textit{Volume} is either abnormal, as defined above, or the log of total dollar volume, computed as the log of 1 plus the price multiplied by the volume on day 0, divided by 1000.

\textit{Press} is set equal to 1 if the spam message quotes an old press release about the targeted company, and 0 otherwise. \textit{Implied Return}_\text{Press} (No Press) is the implied return for the sample of spam with (without) a press release. The implied return is the log of 1 plus the difference between the target price included in the spam and the current price, divided by the current price, and is set equal to 0 for observations without target prices. By focusing on the magnitude of the return implied by the target price, rather than merely the inclusion of a target price as in our previous analyses, these regressions provide a strong test of the extent to which investors focus on the payoff touted for the targeted stock. Because we predict an interaction effect between target prices and press releases, we report separate coefficient estimates for implied returns with and without a press release. \textit{Disclaim} is set equal to 1 if the spam message includes a disclaimer, and 0 otherwise.

\[^{18}\text{Although this analysis ideally would use bid and ask prices to compute midpoint returns, we do not have access to such data for our sample of microcap stocks.}\]
Finally, we control for volume and spam frequency. Barber and Odean (2008) report that abnormal volume is a strong indicator of investor attention; when volume is unusually heavy, it is likely that investors are paying more attention than usual to the stock. In equation (1), we use *Abnormal Volume*, as defined above, and in equation (2) we use the relevant lagged measure of volume on spam day –1. We control for *Spam Frequency*, the natural log of the number of duplicate spam messages for each spam event, because sending more messages likely increases the number of potential investors that are aware of the targeted stock.

Table 5, Panel A reports summary statistics for the returns regressions. In both estimations, the coefficient estimates on *Press* and *ImpliedReturn_No Press* are insignificant, indicating that an old press release or a target price in the spam message does not by itself trigger a market response. In contrast, *ImpliedReturn_Press* is positive and significant in both regressions, as expected. The larger the return implied by the spammer’s target price, the larger the return reaction on the spam date, provided the spam message also quotes an old press release about the targeted company. The evidence regarding the effect of disclaimers in spam messages is mixed; the coefficient estimate on *Disclaim* is negative, as predicted, but the result is significant only in the raw returns regression. Finally, the coefficient estimates on the investor attention controls, *Abnormal Volume* and *Spam Frequency*, are generally positive and significant.

Results from the volume regressions reported in Panel B of Table 5 provide consistent inferences. Specifically, the volume reaction is increasing in the magnitude of the return implied by the target price for spam emails also containing press release information. Although there is some evidence that volume is increasing with the implied return even without a quoted press release, this result is marginally significant at the 0.09 level only in the dollar volume regression.
Finally, there is some evidence that a disclaimer significantly dampens the market response, but this result is not consistent across both estimations.
(iii) Robustness Checks

To further examine the extent to which heavy touting of targeted stocks affects the market response, we partition the sample into high and low frequency touts and re-estimate equations (1) and (2). Because the number of duplicate spam messages associated with each spam event generally increases over time, as discussed in Section 4.1, we partition based on the median number of duplicate touts for each sub-period of our sample. Consistent with increased investor attention for stocks more heavily targeted by spam emails, untabulated results show that high frequency spam events produce a larger market reaction. In the returns regression, $ImpliedReturn_{Press}$ is positive and significant only in the high frequency partition. Moreover, $ImpliedReturn_{No\ Press}$ is significant at the 0.06 level in this partition. Inferences are similar for abnormal volume.

Although the evidence in Table 5 indicates that investors’ response to spam is increasing in the magnitude of the implied return when press release information is also present, it is possible that this effect tapers off as the implied return becomes excessive. Thus, we re-estimate equations (1) and (2) including the interaction of squared implied returns and press release; we expect a negative coefficient on this variable if investors discount unreasonably high target prices. Untabulated results reveal that the coefficient estimate is negative in all regressions, but significantly so only in the volume regressions. These findings suggest that as target prices become excessively optimistic, trading in the targeted stock is dampened.

In additional sensitivity analysis, we consider explanations for the insignificant press release main effect. We would not expect press releases to trigger a market response, either when originally released or when subsequently repeated in the spam email, if they do not contain relevant news. Alternatively, investors could recognize the press release information quoted in
spam as old news and hence not react to it directly, but rather as validation for the target price. To provide some evidence to distinguish between these alternative explanations, we locate the actual press releases and test for a market reaction on the date originally issued, a mean (median) 25 (10) trading days prior to the spam date. Untabulated findings reveal significant returns and volume reactions around the original issuance of the press releases. Thus, the lack of a market response to the press release at the spam date is not because the information is irrelevant. Instead, the results are consistent with the notion that the stale press release information acts to lend credibility to target prices.

Overall, the findings reported in this section show that the market response to spam is concentrated in the subset of stocks targeted by spam emails containing target prices and old press releases. Moreover, investors do not simply consider a single attribute of the message, but rather are most effectively swayed by the combination of these attention-grabbing devices, even in the presence of a disclaimer by the spammer. This evidence suggests that investors discriminate between spam emails, focusing on those where the spammers’ optimistic message is bundled with apparently credible information and ignoring those that appear to be baseless touts. Yet, the evidence also shows that investments in targeted stocks rarely perform as projected, with any price and volume increases reversing within a few days of the spam campaign. These findings suggest that individual investors are limited in their ability to process information, leading to suboptimal investing decisions.

6. Additional Evidence on Stock Spam Schemes

(i) Determinants of stocks targeted by spam

In this section, we investigate whether spammers systematically target microcap stocks with certain features. On the one hand, targeted stocks may be randomly chosen if spammers
believe they can craft an enticing tout for any of the potential microcap targets. Alternatively, spammers may target stocks that have attracted their attention. After all, spammers face the same search and information processing limitations as any other individual. In either case, spammers have an incentive to focus on stocks with relatively low transaction costs to maximize the potential profits from the scheme.

Our analysis compares the sample of targeted stocks to two control samples. The Spam Control Sample consists of random dates from 6 to 18 months before or after the spam date for the stock spam sample while the Random Control Sample consists of a random sample of OTC Bulletin Board and Pink Sheets stocks on randomly chosen dates that are not identified as having been spammed. If any of the random dates in either of the two control samples is in fact a spam date not identified by our sample sources, then we bias against finding any differences between the spam and control samples.

Following Barber and Odean (2008), we use press releases (i.e., news) and returns as proxies for attention. We search for press releases using Google Archived News Search which identifies press releases primarily from PR Newswire, techweb, Primezone, PR Web, and Business Wire. To proxy for transaction costs, we include dollar volume and the number of days with positive trading volume (Lesmond et al., 1999). All variables are calculated over the period from three months to one month preceding the spam date to mitigate the possibility the spammer’s actions in setting up the spam scheme affect their measurement.

Table 6 provides the results of logistic regression analyses where the dependent variable is set equal to 1 for observations in the Spam Sample, and 0 for observations in the respective Control samples. Consistent with spammers targeting attention-grabbing stocks, the coefficient

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19 We do not use the previously gathered press releases quoted in spam messages for the spam sample unless also identified by the Google Archived News Search as this could bias in favor of finding a significant difference between the spam sample and the control samples.
estimate on Press is positive and significant in both regressions. There is also some evidence that past returns are higher for targeted stocks, but this findings is only significant relative to the Random Control Sample. Additionally, the results suggest that spammers favor relatively liquid stocks as Dollar Volume is significantly positive in both regressions and Days Positive Volume is significantly positive compared to the Random Control Sample. Overall, the results suggest that spammers do not randomly target stocks, but rather focus on attention-grabbing stocks with relatively low transaction costs.\(^{20}\)

(ii) Determinants of SEC Enforcement

To provide evidence on features of spam schemes that are likely to trigger an enforcement action by the SEC, we estimate a logistic regression with the dependent variable set equal to 1 for firms in the spam sample that are named in an SEC enforcement action as a targeted company, and 0 otherwise.\(^{21}\) We conduct this analysis at the firm level because we are not able to determine from the SEC documentation which spam scheme(s) triggered the enforcement action when there are multiple spam events for the same targeted company.

The explanatory variables in this model capture the extent and effects of the spam campaign — spam date Returns, Abnormal Volume, Spam Frequency, and Spam Duration, measured as the log of the number of days the spam campaign extended — as well as the content of the spam messages — Press, Implied Return_Press (No Press), and Disclaim. The indicator variables Press and Disclaim are set equal to 1 if any of the spam messages targeting the

\(^{20}\) Spam schemes often involve management collusion, as discussed in Section 2, and thus the targeted stock is predetermined. Although we do not have information on management’s role for all the spam schemes in our sample, we use the sample of spam-related SEC enforcement actions to identify 20 spam schemes involving management collusion. Excluding these observations and their respective matches from the estimations does not alter inferences.

\(^{21}\) The SEC enforcement documents do not always identify all companies targeted in the spam scheme, in some cases reporting only the number of targeted companies. To the extent our analysis does not correctly identify all firms involved in an SEC enforcement action, this will bias against finding significant results.
company contained these attributes, while the continuous variables are averaged across all spam events for a particular targeted company.

The results of the logistic estimation are reported in Table 7. Consistent with a focus on high profile cases, the likelihood of SEC intervention is increasing in the magnitude of spam date returns and the duration of the scheme. Given spammers incentives to increase the liquidity of the targeted stock and our evidence of a significant spam date increase in trading volume, it is somewhat surprising that the likelihood of SEC enforcement does not also increase when there is an unusual level of trading activity. The results also suggest that the SEC considers the content of spam messages in making enforcement decisions. SEC enforcement is decreasing in the optimism of target price projections bundled with press release information and when the spam message contains a disclaimer. These results suggest that SEC enforcement is less likely, all else equal, for spam schemes with some of the more sophisticated email touts.

7. Summary and Conclusion

This study examines the role of attention in investment decisions using a sample of firms targeted by stock spam and detailed data on the information contained in the spam messages. We find that trading volume more than doubles in the days immediately following the spam campaign, and the mean return is positive and significant. However, the median return is zero, with nearly as many firms experiencing negative returns as positive on the spam date. Thus, touting the relatively unknown microcap companies that are the favored targets of spammers

22 In untabulated analysis, we find that including the natural log of 1 plus the number of shares provided as compensation to the spammer in this regression produces an incrementally positive result at the 0.05 level. Thus, although the disclaimer section affords some degree of legal protection for spammers, the amount of share compensation increases the likelihood of SEC enforcement. This variable is insignificant in the market response analysis, however, suggesting that share compensation for spammers is a concern of the SEC’s even though it does not affect individuals’ investment decisions.
temporarily improves liquidity without having a significant effect on the stock price of most targeted companies.

We posit that the market reaction to stock spam is related to specific attention-grabbing attributes of spam messages. Consistent with predictions, combining optimistic target price projections with credible, but stale, information from old press releases increases the return and volume reaction to spam. Moreover, the larger the return implied by the target price, the larger the market reaction. We find some evidence that including a disclaimer in spam messages reduces the market response, but this finding is not significant in all specifications.

We also investigate the determinants of stocks targeted by spammers and enforcement actions by the SEC. We find that spammers favor attention-grabbing stocks (i.e., those in the news and with high past returns) with relatively low transaction costs. Similarly, facets of the spam scheme that are likely to attract the SEC’s attention (i.e., high spam date returns and a long duration of the scheme) are more likely to trigger an enforcement action. The likelihood of enforcement is decreasing, however, in the optimism of target price projections bundled with press release information and the inclusion of a disclaimer, suggesting that SEC enforcement activities do not target some of the more sophisticated spam schemes.

Examining investor attention in the context of stock spam entails some trade-offs. On the one hand, stock spam invariably targets small securities with relatively little publicly available financial or other information. This paucity of information presents some limits on the analyses. On the other hand, the relative obscurity of these stocks offers a unique opportunity to examine attention effects unfettered by pre-existing knowledge of the company and the possibility of confounding information events. Moreover, our targeted investigation allows us to provide an in-depth analysis of how information attributes affect investor attention. Overall, the approach in
our paper and the findings we report complement and extend the growing literature on investor attention and individual investors’ response to information.
Appendix. Examples of Stock Spam Messages

Target Company: New Millennium Media (OTCBB: NMMG), February 10, 2002

NMMG - STRONG BUY - HUGE COVERAGE - MAJOR CONTRACT ANNOUNCEMENTS

NMMG will be profiled by some major newsletters along with the release of significant news regarding explosive sales for the Company. There will be huge volume and a strong increase in price for several days. The same newsletters that profiled IACP will begin coverage on NMMG. They brought IACP from $.50 to $4.35 in 10 days! We know for certain that the same groups are going to profile NMMG.

We are very proud that we can share this information with you so that you can make a profit out of it. It is highly advisable to take a position in NMMG as soon as possible, today before the market closes, or tomorrow.

The stock has been a breakout performer and will continue moving up immediately. We think the stock can easily reach $2.00 in less than a month. Good luck and watch NMMG fly this week!

Target Company: Digilava Inc. (Pink Sheets: DGLV), March 11, 2004

Watch DGLV - Don't Miss DGLV - March Top Stock Choice

Current Price: $0.19 Speculative NEar Term Target Price - $0.79

- DGLV is a leading San Francisco-based Application Service Provider (ASP) of permission-based rich media direct response marketing and communications that offers empowering technology to direct marketers, web publishers and advertisers. Their Products Include: Bannerforge and VideoMail Studio

DigiLava Signs Letter of Intent To Acquire Strategic Partner -- Local Area Yellow Pages

DigiLava, Inc. (Pink Sheets: DGLV), a leading San Francisco based Application Service Provider of rich-media direct response marketing, today announced that the Company has executed a Letter of Intent to acquire Local Area Yellow Pages (LAYP), which is currently utilizing DigiLava's proprietary technology.

"The intent to acquire Local Area Yellow Pages is part of the company's strategic business plan to expand both its technology offerings and business customer base. The continuous role-up strategy positions the Company to take a proactive leading role in the Media and Internet market," stated Baldwin Yung, CEO of DigiLava. "Subject to final due diligence and Board approval, the acquisition entails the retention of key business customer channel and a significant revenue base."

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**Target Company:** eUniverse (NASDAQ: EUNI), March 18, 2002

<table>
<thead>
<tr>
<th>eUniverse, Inc. (NASDAQ: EUNI)</th>
<th>Six Month Target Price: $13.18</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Revenue (millions)</strong></td>
<td><strong>FY 03/00</strong></td>
</tr>
<tr>
<td></td>
<td>$1.8</td>
</tr>
<tr>
<td><strong>Earnings per share (diluted)</strong></td>
<td>($0.42)</td>
</tr>
<tr>
<td>52-Week Range</td>
<td>$1.031 - $8.50</td>
</tr>
<tr>
<td>Shares Outst. (fully diluted)</td>
<td>30.0 million</td>
</tr>
<tr>
<td>Fiscal Year End</td>
<td>March 31</td>
</tr>
<tr>
<td>Revenue/Share (TTM)</td>
<td>$1.03</td>
</tr>
</tbody>
</table>

**A Few Reasons to Consider EUNI:**

- Nielsen/NetRatings ranked the Company number 6 among the 10 most visited Web sites in the world, right behind MSN, Yahoo, and AOL.
- Fiscal year Q3 ending Dec. 31, 2001, revenue topped $10 Million Mark for the First Time. Net Profit Increased 131% sequentially to $2.0 Million. Higher Net Income than Yahoo!
- EUNI entered into a strategic agreement with ATandT that is expected to reduce costs and facilitate network expansion.

**Valuation and Conclusion**

**Valuation**

Based on $0.40 per share in earnings for the upcoming fiscal year (beginning next month), this would equate to a stock price of $13.18 per share. If we look to value EUNI on a multiple of revenues, then we should look no further than Yahoo. Unlike Yahoo, EUNI is growing in just about all aspects of their business, the only difference for the most part is, Wall Street has not heard of EUNI. If EUNI were to trade today in the marketplace, at the same multiple of revenues as Yahoo (which is 8 times), then based on analysts forecasts of $52.8 Million in revenues for the upcoming fiscal year, this would equate to a stock price of $14.08 per share.

**Conclusion**

With the continued positive outlook in EUNI's revenue and earnings growth, we believe that EUNI is a compelling and undervalued investment opportunity for risk oriented investors. We believe, as Wall Street catches on to the EUNI story, this could have positive effect to EUNI's share price.

******* Important Notice and Disclaimer: Please Read *******

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REFERENCES


Green, T. and B. Hwang (2009), ‘IPOs as lotteries: Expected skewness and first-day returns’, Working paper, Emory University.


This figure shows the univariate (Panel A) and bivariate (Panel B) distributions of implied returns compared to six-month realized returns for the sample of 236 unique spam messages containing both a target and current share price.
Table 1
Spam-related SEC enforcement activity

Panel A: Types of schemes identified in enforcement actions

<table>
<thead>
<tr>
<th>Scheme Characteristics</th>
<th>Total</th>
<th>Management Collusion</th>
<th>Boiler Room</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unique litigation releases</td>
<td>84</td>
<td>67</td>
<td>17</td>
</tr>
<tr>
<td>Paid Promoter</td>
<td>42</td>
<td>41</td>
<td>1</td>
</tr>
<tr>
<td>Press Release Fraud</td>
<td>45</td>
<td>44</td>
<td>1</td>
</tr>
<tr>
<td>Target Price</td>
<td>24</td>
<td>20</td>
<td>4</td>
</tr>
</tbody>
</table>

Panel B: Compensation, profits, and penalties

<table>
<thead>
<tr>
<th></th>
<th>Discussed, No Amount Disclosed</th>
<th>Amount Disclosed</th>
<th>Median</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compensation Paid</td>
<td>14</td>
<td>20</td>
<td>$180,000</td>
<td>$3,300</td>
<td>$540,000</td>
</tr>
<tr>
<td>Cash</td>
<td>8</td>
<td>8</td>
<td>$180,000</td>
<td>$3,300</td>
<td>$540,000</td>
</tr>
<tr>
<td>Shares</td>
<td>11</td>
<td>17</td>
<td>500,000</td>
<td>44,000</td>
<td>2 billion</td>
</tr>
<tr>
<td>Trading Profits</td>
<td>0</td>
<td>52</td>
<td>$804,687</td>
<td>$8,200</td>
<td>$37,245,481</td>
</tr>
<tr>
<td>Civil Penalty</td>
<td>31</td>
<td>18</td>
<td>$120,000</td>
<td>$12,567</td>
<td>$3,700,000</td>
</tr>
</tbody>
</table>

Panel C: Correlation matrix

<table>
<thead>
<tr>
<th></th>
<th>Mgmt. Collusion</th>
<th>Paid Promoter</th>
<th>Press Release Fraud</th>
<th>Target Price</th>
<th>Cash</th>
<th>Shares</th>
<th>Trading Profits</th>
<th>Civil Penalty</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mgmt. Collusion</td>
<td>1</td>
<td>0.44</td>
<td>0.48</td>
<td>0.05</td>
<td>0.07</td>
<td>0.12</td>
<td>0.22</td>
<td>0.03</td>
</tr>
<tr>
<td>Paid Promoter</td>
<td>1</td>
<td>0.02</td>
<td>0.21</td>
<td>0.17</td>
<td>0.17</td>
<td>0.30</td>
<td>0.22</td>
<td>0.04</td>
</tr>
<tr>
<td>Press Release Fraud</td>
<td>1</td>
<td>0.17</td>
<td>-0.14</td>
<td>-0.16</td>
<td>0.20</td>
<td>0.01</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Target Price</td>
<td>1</td>
<td>0.39</td>
<td>-0.04</td>
<td>0.39</td>
<td>0.13</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cash</td>
<td>1</td>
<td>0.28</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shares</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-0.11</td>
</tr>
<tr>
<td>Trading Profits</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.19</td>
<td></td>
</tr>
<tr>
<td>Civil Penalty</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
</tbody>
</table>
This table details SEC enforcement activity related to stock spam schemes. Panel A shows the number of unique spam-related enforcement actions classified into two mutually exclusive groups: (i) Management Collusion schemes involving an executive of the targeted company; and (ii) Boiler Room schemes that do not involve management of the targeted company. For each type of spam scheme, Panel A reports the number in which the SEC complaint noted the following characteristics: (i) Paid Promoter schemes involving a third party email marketing firm; (ii) Press Release Fraud schemes involving the issuance of fraudulent press releases; and (iii) Target Price schemes involving a target price projection in the spam email. Panel B provides summary statistics on compensation paid (only for cases involving a Paid promoter); Trading Profits (total trading profits by all named defendants); and Civil Penalties (total civil penalties levied against all defendants in excess of the disgorgement of profits and interest). Panel C shows Pearson correlations where Cash is the natural log of 1+cash compensation; Shares is the natural log of 1+the number of shares received in compensation; Trading Profits is the natural log of 1+the dollar amount of profits earned in the scheme; and Civil Penalty is the natural log of 1+the dollar amount of penalties assessed by the SEC. Because Management Collusion and Boiler Room schemes are orthogonal, we only tabulate correlations for the former. Correlations for boiler room schemes are equal but of opposite signs to those of the management collusion schemes. Correlations in bold (italics) are significant at the 5% (10%) level.
### Table 2
Descriptive statistics for spam sample

Panel A: Sample composition and content of spam messages

<table>
<thead>
<tr>
<th></th>
<th>Pooled</th>
<th>(1) 1999–2001</th>
<th>(2) 2002–2004</th>
<th>(1) vs. (2)</th>
<th>(3) 2005–2006</th>
<th>(2) vs. (3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of unique spam messages</td>
<td>639</td>
<td>40</td>
<td>135</td>
<td></td>
<td>464</td>
<td></td>
</tr>
<tr>
<td>Number of unique targeted companies</td>
<td>423</td>
<td>35</td>
<td>100</td>
<td></td>
<td>307</td>
<td></td>
</tr>
</tbody>
</table>

**Percentage of Messages Including (all figures represent % unless otherwise noted):**

- **Quoted press release**: 74 vs. 55 vs. 66 vs. 78
- **Verifiable press release**: 68 vs. 50 vs. 59 vs. 72
- **Safe Harbor language**: 65 vs. 25 vs. 72
- **Disclaimer not using Safe Harbor language**: 14 vs. 45 vs. 10
- **Claim to have received monetary compensation**: 46 vs. 28 vs. 53
- **(Median dollars received)**: $10,000 vs. $10,000 vs. $12,000 vs. $10,000
- **Claim to have received share compensation**: 14 vs. 15 vs. 18 vs. 13
- **(Median number of shares received)**: 200,000 shrs vs. 95,500 shrs vs. 100,000 shrs vs. 500,000 shrs
- **Name of party responsible for spam**: 40 vs. 60 vs. 56 vs. 34
- **Quoted current price**: 71 vs. 45 vs. 55 vs. 78
- **Target price**: 41 vs. 40 vs. 44 vs. 40

Panel B: Target prices and implied returns (n = 236)

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Median</th>
<th>Q1</th>
<th>Q3</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Quoted target price</strong></td>
<td>$5.55</td>
<td>$1.38</td>
<td>$0.50</td>
<td>$3.50</td>
</tr>
<tr>
<td><strong>Current price</strong> (observations with non-missing target price)</td>
<td>1.01</td>
<td>0.30</td>
<td>0.14</td>
<td>1.03</td>
</tr>
<tr>
<td><strong>Implied return</strong></td>
<td>517%</td>
<td>256%</td>
<td>113%</td>
<td>461%</td>
</tr>
</tbody>
</table>

Panel A presents descriptive evidence on the content of spam emails over the sample period. Characteristics include information quoted from a press release either attributed to the targeted company or without specifically identifying the source; quoted press release information that can be verified as having been posted to LexisNexis or Factiva; safe harbor language or some other disclaimer about the accuracy of the information in the spam; disclosure that the spammer received monetary or share compensation and if so, the amount in dollars and/or shares; disclosure of the name of the party responsible for sending the spam message; current share price of the targeted stock; and a target price for the targeted stock. Panel B presents information on the distributions of quoted target prices, current share prices, and the implied return calculated as the difference between the target price and current price, divided by the current price. *, **, *** indicates significance at or below the 10%, 5%, 1% level, respectively.
Table 3
Spam date returns and abnormal volume

Panel A: Raw returns (n = 639)

<table>
<thead>
<tr>
<th>Window</th>
<th>Mean</th>
<th>Median</th>
<th>Q1</th>
<th>Q3</th>
<th>Percent Positive</th>
<th>Percent Negative</th>
</tr>
</thead>
<tbody>
<tr>
<td>(−1,1)</td>
<td>0.08***</td>
<td>0.00</td>
<td>−0.10</td>
<td>0.15</td>
<td>47</td>
<td>45</td>
</tr>
<tr>
<td>(0,0)</td>
<td>0.04***</td>
<td>0.00</td>
<td>−0.06</td>
<td>0.09</td>
<td>43</td>
<td>43</td>
</tr>
<tr>
<td>(0,1)</td>
<td>0.04***</td>
<td>0.00</td>
<td>−0.09</td>
<td>0.11</td>
<td>44</td>
<td>45</td>
</tr>
<tr>
<td>(0,5)</td>
<td>−0.01</td>
<td>−0.04***</td>
<td>−0.20</td>
<td>0.12</td>
<td>39</td>
<td>55</td>
</tr>
<tr>
<td>(0,10)</td>
<td>−0.06***</td>
<td>−0.09***</td>
<td>−0.28</td>
<td>0.09</td>
<td>33</td>
<td>62</td>
</tr>
</tbody>
</table>

Panel B: Abnormal volume (n = 563)

<table>
<thead>
<tr>
<th>Day</th>
<th>Median</th>
<th>Q1</th>
<th>Q3</th>
</tr>
</thead>
<tbody>
<tr>
<td>−3</td>
<td>1.02</td>
<td>0.46</td>
<td>2.68</td>
</tr>
<tr>
<td>−2</td>
<td>1.23</td>
<td>0.48</td>
<td>3.12</td>
</tr>
<tr>
<td>−1</td>
<td>1.53</td>
<td>0.54</td>
<td>4.12</td>
</tr>
<tr>
<td>0</td>
<td>2.71</td>
<td>0.98</td>
<td>8.36</td>
</tr>
<tr>
<td>+1</td>
<td>2.71</td>
<td>0.98</td>
<td>8.82</td>
</tr>
<tr>
<td>+3</td>
<td>2.11</td>
<td>0.68</td>
<td>6.48</td>
</tr>
<tr>
<td>+5</td>
<td>1.90</td>
<td>0.71</td>
<td>5.91</td>
</tr>
</tbody>
</table>

Panel A (Panel B) presents raw returns (abnormal volume) surrounding the first date a unique spam is released (day 0). Percent Positive (Negative) represents the percentage of returns for a given interval that are positive (negative). Summations within a row are less than 100% because of returns of zero. Abnormal Volume is calculated as the share volume on a given day divided by the median volume over the window (−20,−2); values greater (less) than 1 indicate relatively high (low) volume. The total number of observations in Panel B, 563, is less than the 639 unique spam observations in the sample because 76 observations have zero trading volume in the benchmark period. *, **, *** indicates significantly different from zero at the 10%, 5%, 1% level, respectively, using two-tailed tests.
Table 4

Effect of spam content on returns

Panel A: Target price

<table>
<thead>
<tr>
<th>Target Price</th>
<th>N</th>
<th>Mean (–1,1)</th>
<th>Median (–1,1)</th>
<th>Mean (0,0)</th>
<th>Median (0,0)</th>
<th>Mean (0,1)</th>
<th>Median (0,1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>380</td>
<td>0.04**</td>
<td>0.00</td>
<td>0.01</td>
<td>0.00*</td>
<td>0.01</td>
<td>0.00*</td>
</tr>
<tr>
<td>Yes</td>
<td>259</td>
<td>0.14***</td>
<td>0.03**</td>
<td>0.07***</td>
<td>0.01**</td>
<td>0.08***</td>
<td>0.03**</td>
</tr>
</tbody>
</table>

Panel B: Press release

<table>
<thead>
<tr>
<th>Press Release</th>
<th>N</th>
<th>Mean (–1,1)</th>
<th>Median (–1,1)</th>
<th>Mean (0,0)</th>
<th>Median (0,0)</th>
<th>Mean (0,1)</th>
<th>Median (0,1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>176</td>
<td>0.13***</td>
<td>0.00</td>
<td>0.03*</td>
<td>0.00</td>
<td>0.05**</td>
<td>0.00</td>
</tr>
<tr>
<td>Yes</td>
<td>463</td>
<td>0.06***</td>
<td>0.00</td>
<td>0.04***</td>
<td>0.00</td>
<td>0.04***</td>
<td>0.00</td>
</tr>
</tbody>
</table>

Panel C: Press release and target price

<table>
<thead>
<tr>
<th>Press Release</th>
<th>Target Price</th>
<th>N</th>
<th>Mean (–1,1)</th>
<th>Median (–1,1)</th>
<th>Mean (0,0)</th>
<th>Median (0,0)</th>
<th>Mean (0,1)</th>
<th>Median (0,1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>No</td>
<td>76</td>
<td>0.09*</td>
<td>–0.02</td>
<td>–0.01</td>
<td>–0.01</td>
<td>0.01</td>
<td>–0.01</td>
</tr>
<tr>
<td>Yes</td>
<td>No</td>
<td>304</td>
<td>0.03*</td>
<td>0.00</td>
<td>0.02</td>
<td>0.00</td>
<td>0.01</td>
<td>0.00</td>
</tr>
<tr>
<td>No</td>
<td>Yes</td>
<td>100</td>
<td>0.17***</td>
<td>0.03</td>
<td>0.05**</td>
<td>0.00</td>
<td>0.07**</td>
<td>0.01</td>
</tr>
<tr>
<td>Yes</td>
<td>Yes</td>
<td>159</td>
<td>0.13***</td>
<td>0.03*</td>
<td>0.09***</td>
<td>0.03**</td>
<td>0.09***</td>
<td>0.03*</td>
</tr>
</tbody>
</table>

Panel D: Disclaimer

<table>
<thead>
<tr>
<th>Disclaimer</th>
<th>N</th>
<th>Mean (–1,1)</th>
<th>Median (–1,1)</th>
<th>Mean (0,0)</th>
<th>Median (0,0)</th>
<th>Mean (0,1)</th>
<th>Median (0,1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>137</td>
<td>0.18***</td>
<td>0.02</td>
<td>0.07***</td>
<td>0.00</td>
<td>0.08***</td>
<td>0.04</td>
</tr>
<tr>
<td>Yes</td>
<td>502</td>
<td>0.06***</td>
<td>0.00</td>
<td>0.03***</td>
<td>0.00</td>
<td>0.03**</td>
<td>0.00</td>
</tr>
</tbody>
</table>

This table sorts the sample based on whether the spam message includes a target price (Panel A), information from a previously issued press release (Panel B), a combination of press release and target price (Panel C), or a disclaimer (Panel D). The return period windows surround the spam date (day 0). *, **, *** indicates significantly different from 0 at the 10%, 5%, 1% level, respectively, using two-tailed tests.
### Table 5
Determinants of the market reaction to spam

#### Panel A: Returns

<table>
<thead>
<tr>
<th>Variable</th>
<th>Raw Returns</th>
<th></th>
<th></th>
<th>Midpoint Returns</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coeff. Est.</td>
<td>p-value</td>
<td>Coeff. Est.</td>
<td>p-value</td>
<td>Coeff. Est.</td>
<td>p-value</td>
</tr>
<tr>
<td><strong>Intercept</strong></td>
<td>–0.044</td>
<td>0.077</td>
<td>–0.012</td>
<td>0.053</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Press</strong></td>
<td>0.021</td>
<td>0.330</td>
<td>–0.001</td>
<td>0.922</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Implied Return_No Press</strong></td>
<td>0.008</td>
<td>0.612</td>
<td>0.003</td>
<td>0.457</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Implied Return_Press</strong></td>
<td>0.042</td>
<td>0.002</td>
<td>0.007</td>
<td>0.057</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Disclaim</strong></td>
<td>–0.047</td>
<td>0.023</td>
<td>–0.005</td>
<td>0.365</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Abnormal Volume</strong></td>
<td>0.048</td>
<td>&lt; 0.001</td>
<td>0.005</td>
<td>&lt; 0.001</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Spam Frequency</strong></td>
<td>0.005</td>
<td>0.270</td>
<td>0.003</td>
<td>0.004</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Adj. R²</strong></td>
<td>0.132</td>
<td></td>
<td>0.065</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Nobs.</strong></td>
<td>563</td>
<td></td>
<td>528</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Panel B: Volume

<table>
<thead>
<tr>
<th>Variable</th>
<th>Abnormal Volume</th>
<th></th>
<th></th>
<th>Dollar Volume</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coeff. Est.</td>
<td>p-value</td>
<td>Coeff. Est.</td>
<td>p-value</td>
<td>Coeff. Est.</td>
<td>p-value</td>
</tr>
<tr>
<td><strong>Intercept</strong></td>
<td>0.718</td>
<td>&lt; 0.001</td>
<td>1.730</td>
<td>&lt; 0.001</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Press</strong></td>
<td>–0.074</td>
<td>0.512</td>
<td>–0.049</td>
<td>0.720</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Implied Return_No Press</strong></td>
<td>0.063</td>
<td>0.414</td>
<td>0.166</td>
<td>0.087</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Implied Return_Press</strong></td>
<td>0.171</td>
<td>0.003</td>
<td>0.296</td>
<td>&lt; 0.001</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Disclaim</strong></td>
<td>–0.066</td>
<td>0.552</td>
<td>–0.292</td>
<td>0.020</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Lagged Volume</strong></td>
<td>0.647</td>
<td>&lt; 0.001</td>
<td>0.603</td>
<td>&lt; 0.001</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Spam Frequency</strong></td>
<td>0.085</td>
<td>0.001</td>
<td>0.077</td>
<td>0.008</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Adj. R²</strong></td>
<td>0.336</td>
<td></td>
<td>0.453</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Nobs.</strong></td>
<td>563</td>
<td></td>
<td>639</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

This table presents results of regressions of event period (day 0) returns and volume on the content of spam email messages. **Midpoint Returns** are calculated using the midpoint of the high and low prices. **Abnormal Volume** is the natural logarithm of 1 plus the volume on day 0 divided by the median volume over the window (–20,—2). **Dollar volume** is computed as the log of (1 plus the price multiplied by the volume on day 0), divided by 1000. **Press** equals 1 if the spam message refers to a press release, 0 otherwise. **Implied Return** is the log of 1 plus the difference between the target price and the current price, and equals zero when target price is missing. **Disclaim** equals 1 if the spam message includes a disclaimer, 0 otherwise. **Lagged Volume** is relevant volume measure on spam day –1. **Spam Frequency** is the log of the number of duplicate spam messages in the dataset for each unique spam event. All standard errors are computed using the method of White (1980).
## Table 6
Determinants of stocks targeted by spam

<table>
<thead>
<tr>
<th>Variable</th>
<th>Spam Control</th>
<th>Random Control</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coef. Est.</td>
<td>p-value</td>
</tr>
<tr>
<td>Intercept</td>
<td>–1.93</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Press</td>
<td>0.50</td>
<td>0.006</td>
</tr>
<tr>
<td>Returns</td>
<td>0.06</td>
<td>0.127</td>
</tr>
<tr>
<td>Dollar Volume</td>
<td>0.19</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Days Positive Volume</td>
<td>–0.17</td>
<td>0.282</td>
</tr>
</tbody>
</table>

Pseudo R^2                  | 0.088      | 0.259   |
Nobs.                       | 722        | 722     |

This table presents logistic regression analysis for the spam sample relative to two control samples. The Spam Sample includes the first spam message for each ticker with available price data (361 observations). The Spam Control Sample consists of random dates from 6 to 18 months before or after the spam date for our stock spam sample. The Random Control Sample consists of a random sample of stocks not identified as having been spammed trading on the OTC Bulletin Board or PinkSheets on randomly chosen dates. Press (an indicator variable set equal to 1 if the firm issued a press release), Returns (the raw return), Dollar Volume (the log of 1 plus dollar volume), and Days Positive Volume (log of 1 plus the number of days with positive trading volume), are calculated for the period from three months preceding the event date to one month preceding the event date. Returns are winsorized at the top and bottom 1%. *, **, *** indicates significantly different from 0 at the 10%, 5%, 1% level, respectively, using two-tailed tests.
Table 7
Determinants of spammed stocks targeted by SEC

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coeff. Est.</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>–2.74</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>Returns</td>
<td>2.09</td>
<td>0.02</td>
</tr>
<tr>
<td>Abnormal Volume</td>
<td>0.12</td>
<td>0.47</td>
</tr>
<tr>
<td>Spam Frequency</td>
<td>–0.27</td>
<td>0.15</td>
</tr>
<tr>
<td>Spam Duration</td>
<td>0.56</td>
<td>0.01</td>
</tr>
<tr>
<td>Press</td>
<td>1.00</td>
<td>0.20</td>
</tr>
<tr>
<td>Implied Return_No Press</td>
<td>–0.38</td>
<td>0.58</td>
</tr>
<tr>
<td>Implied Return_Press</td>
<td>–0.76</td>
<td>0.05</td>
</tr>
<tr>
<td>Disclaim</td>
<td>–1.17</td>
<td>0.01</td>
</tr>
</tbody>
</table>

Pseudo R² 0.058
Nobs. 373

This table presents the results of a logistic regression analysis where the dependent variable is set equal to one for firms named in an SEC enforcement action (29 observations) and 0 for firms not named in an enforcement action (344 observations). Because the analysis is conducted at the firm level, multiple spam events targeting the same firm are collapsed into a single observation. Returns is the average spam date raw return; Abnormal Volume is the natural logarithm of 1 plus the volume on day 0 divided by the median volume over the window (–20, –2); Spam Frequency is the log of the average number of spam messages; Spam Duration is the log of the average duration in days of all spam messages targeting the company; Press is set equal to 1 if any spam message targeting the firm included a press release, and 0 otherwise; Implied Return is the log of 1 plus average implied return based on the target price relative to the current price; and Disclaim is set equal to 1 if any spam message targeting the firm includes a disclaimer.