Original Article

Estimating the value of internet marketing in the US pharmaceutical industry

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ABSTRACT On 2 April 2009 the Food and Drug Administration (FDA) released warning letters to 14 major pharmaceutical companies about search engine advertising, effectively curtailing an aspect of internet marketing by pharmaceutical industry. These warning letters were posted to the public on 3 April 2009. Given that the efficient market hypotheses suggest that stock prices fully reflect all publicly available information and are unbiased indicators of firm value, this article presents an analysis of stock market reactions of pharmaceutical firms around the time of the FDA announcement, using both regular and abnormal returns. We analyze two groups of firms, those that received the warning letters and those that did not receive the letters. We find a significantly negative stock market reaction for both groups of firms, suggesting that the letters had negative impact on shareholder's value to the industry as a whole. The results indicate that internet marketing is important, and thus it is imperative that the industry works in tandem with the FDA to develop better guidelines on the appropriate use of the internet for the marketing of pharmaceuticals. The cost for pharmaceutical firms for not utilizing the internet capabilities to communicate value to the stakeholders can be significant.

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INTRODUCTION

On 2 April 2009 the Food and Drug Administration's (FDA) Division of Drug Marketing, Advertising and Communications (DDMAC) released warning letters that were sent to 14 major pharmaceutical companies about internet advertising that accompanied searches on

Google and Yahoo search engines. These letters stated that the sponsored links on the search engines were misleading because of (1) omission or minimization of risk information, (2) failure to communicate indications or (3) omission of established drug name in accordance with the concept of fair balance.[1] Review of the warning letters indicate that omission or minimization of risk information is the most frequent violation of the regulation cited in advertising and promotion enforcement letters sent to sponsors. According to the 21 CFR FDA §202.1(e) regulations, 'All advertisements for any prescription drug … shall present a true statement of information in brief summary relating to side effects, contraindications … and effectiveness', and there must be a fair balance in the benefits and risk information provided to consumers. Unlike advertisements for other consumer products that are governed by the Federal Trade Commission (FTC), pharmaceutical products are required by the FDA to present a fair balance between information on benefits and risk, so that health-care professionals and consumers receive an accurate and balanced understanding of risks relative to the benefits of the medication. Fair balance is a requirement of all promotions irrespective of the channel media both on or offline for pharmaceutical products with a 'product claim'. Ads that are meant just to create awareness of the disease (help-seeking ads), and remind patients (reminder ads that feature the name of the drug but not indications, dosages, or other representations of safety or effectiveness) are exempt from the fair balance stipulation. The key reason for the finding of violation by the 14 companies was that the sponsored link had inadequate risk information. This is due to limited number of characters available in each ad. For example, Google had room for only 95 characters, including the headline.

The internet marketing warning letters provide a unique opportunity to evaluate the economic value of internet marketing in the pharmaceutical industry. This article estimates the economic value of internet marketing, by studying changes in stock prices of the pharmaceutical firms around FDA announcement of the warning letters. In the next section, we discuss why stock prices are good indicators of the pharmaceutical firm value, the importance of the internet marketing to the pharmaceutical industry, and subsequently develop hypotheses for this study.

RESEARCH FRAMEWORK

Stock prices as indicators of firm value

The efficient market hypotheses (EMH) state that stock prices fully reflect all publicly available information and are unbiased indicators of firm value.[2] Although the debate over the extent of market efficiency continues (for example Barberis and Thaler[3]), the EMH has largely survived the criticisms leveled against it over the past three decades (for example Fama[4]). Overall, the extant body of research seems to indicate that US capital markets are 'very efficient'.[5] Even critics of market efficiency find that, the broader market can have pockets of inefficiency, most individual stocks are efficient (for example Jung and Shiller[6]). Thus, to the extent that stock prices accurately reflect future cash flows, they can serve a vital economic function by providing feedback when the expectation of cash flows changes. Specifically, capital markets convey through stock price their expectation of a firm's future prospects given that firm's current and anticipated strategies.[7]

The stock market's reaction to marketing actions

Substantial research has investigated stock market reactions to marketing actions of firms. Specifically, the extent literature indicate that stock markets react positively to new branding initiatives such as changes to company names,[8] improvement in customer service,[9] achieving quality awards,[10] use of celebrity endorsements,[11] corporate Olympic sponsorship[12] and improvements in customer quality perceptions (for example Aaker and Jacobson[13]) and brand attitudes.[14] Mizik and Jacobson[15] reported that the stock market, in general, reacts favorably to a firm's shifting its strategic focus from value creation (i.e., product innovation and development activities) to value appropriation (i.e., extracting profits through intensive product marketing). With regard to high-tech industries such as pharmaceuticals, Mizik and Jacobson find that the stock market reacts favorably to value appropriation due to successful products on the marketing extracting profits firms them innovations, especially when the firms have strong profitability. In this study, we analyze the role of Internet marketing on firms market value based on their stock performances.

The value of internet marketing

The internet has revolutionized how businesses market to their customers. Internet marketing plays a key role in the economic value of firms. According to Porter,[16] traditional marketing strategies that do not incorporate the internet as a complement will not ensure a sustainable competitive advantage. In recent literature, online marketing has been found to be valuable for pharmaceutical and health care-related products. Online sales have been found to be a more efficient approach than the traditional catalogue order method for selling dental products.[17] Many firms have recognized the potential value of internet-based marketing.[18–20] Many of the top pharmaceutical companies have taken advantage of pharmaceutical internet marketing by placing ads on the internet in the form of banner ads and websites, among other methods. The flexibility in terms of content, targeting and a faster feedback loop provides for a high ROI for internet marketing.

Pharmaceutical companies traditionally use detailing, Direct to Consumer advertising (DTC), meetings and events, internet marketing, and journal advertising as part of their communication strategies. In 2008, pharmaceutical companies spent on average 58.7 per cent of their marketing budget on detailing, 22.8 per cent on DTC, 14.4 per cent on meetings and events, 2.4 per cent on internet marketing, and 1.7 per cent on journal advertising.[21] In 2008, the top 10 pharmaceutical companies on an average spent 2.3 per cent of the total promotional budget on e-promotions, which was up from 1.7 per cent in 2007.[21] The growing interest in internet is because unlike other media channels, the internet provides advantages such as the ability to target very specific groups of consumers with minimal waste coverage; the ability to tailor messages to meet the informational needs of the target audience, interactivity with customers; and the ability to link multiple information outlets, such as DTC, radio and direct mail campaigns by providing the website information in those ads. Internet marketing costs per contact are relatively small, provide exposure to companies that have relatively small budgets, offer a quick means to update information that is current and relevant to the target markets, and complement other communication channels.

Yet, utilization of the internet by the pharmaceutical industry has been relatively sparse. A recent survey of 220 pharmaceutical industry executives

conducted by Pharmaceutical Executive and MarketBridge LifeSciences Practice identified reasons for the slow adaptation.[22] The top three reasons are (1) inability to prove that ROI (2) lack of experience with new technology platforms, and (3) regulatory issues. This article addresses the issue of ROI. The calculation of ROI for internet marketing is complex, given the difficulties in estimating the marginal impact of internet marketing. The FDA announcement provides a unique opportunity, whereby search engine, an aspect of internet marketing, had to be stopped by the firms. Stock market reactions can at least help answer the question whether internet marketing is marginally a positive Net Present Value project; that is, if internet marketing has an ROI above the threshold.

Impact of warning letters on firm value

FDA is an important component of the regulatory environment in which pharmaceutical companies operate. FDA not only regulates product approval but also the promotions of pharmaceuticals as well. The DDMAC, within the Center for Drug Evaluation and Research (CDER) at the FDA CDER, is responsible for regulating prescription drug promotion. DDMAC's mission is to protect the public health by helping to ensure that prescription drug information is truthful, balanced and accurately communicated. DDMAC could address promotional materials that are false or misleading by sending the pharmaceutical company warning letters. The warning letter is issued to sponsors for violations, such as those possibly posing serious health risks to the public due to the promotional material that is false or misleading.

FDA's issued warning letters to the pharmaceutical firms on online paid search banner ads for violating FDA's fair balance rules. This provides a unique opportunity and a valuable natural experiment to estimate the impact of internet marketing for the economic value of the pharmaceutical companies.

Stock prices are forward-looking measures that incorporate information about the company on future cash flows. Scheraga and Calfee,[23] highlight two advantages of stock price based event analysis. First, they affirm that stock prices capture the anticipated impact of the benefits and costs of the events. Second, they suggest that capital market would incorporate benefits and costs associated with these events in valuing a firm. Researchers[24] have shown that negative events such as drug withdrawals by the pharmaceutical companies resulted in significant wealth losses based on the stock price event analysis. We expect a decline in the stock price of the companies receiving the warning letters. Internet-based marketing is so pervasive in the current markets that any warning letters to companies preventing them from using the technology would be construed by the shareholders as a potential loss of future cash flows. Thus

Hypothesis 1: The warning letters would have a negative impact on the average security returns (AR) for the pharmaceutical firms that received the letters.

Contagion effect

Contagion is the term used to describe the effects of shock from one or more firms to others with an industry or related industries (inter-industry contagion) or among unrelated industries (intra-industry contagion). Under the inter-industry contagion hypothesis,[25,26] when an announcement reveals adverse information about the portfolio of a particular firm or industry, firms with similar portfolios in the same or related industries react negatively.

The direct implication of this theory is that firms that did not receive the warning letters would also react adversely to announcements that affect the companies that received the warning letters. Any regulation that is a threat to use of internet within the pharmaceutical industry would affect all firms. The internet has industry-level effects and the regulation of the internet therefore also has industry-level effects, leading to negative effects. Thus,

Hypothesis 2: The warning letters announcement would have a negative impact even on the pharmaceutical firms that did not receive the letters.

METHODS

Sample selection

The firms that received the letters constituted the 'Letter' group. Of the 14 firms that received the warning letters, three firms namely Bayer, Boehringer Ingelheim Pharmaceuticals and Genentech were dropped from the sample. Bayer is headquartered in Germany and is listed in Frankfurt. Boehringer Ingelheim Pharmaceuticals, Inc. is the pharmaceuticals unit of Boehringer Ingelheim Corporation, which is the US headquarters of Germany's Boehringer Ingelheim. Both the firms were not listed in the US markets. Genentech was acquired by Roche in March of 2009. We also identified Pfizer, for which there was significant negative news during the period. Pfizer shares may have dropped after its announcement that the number of its experimental drugs had shrunk [27] The reported results are both with and without Pfizer in the sample. We also select six other firms for our 'No Letters' group that are similar in size and comparable to the firms that received the letters. The 'Letters' and 'No Letters' firms are listed in Table 1.

To understand the effect of warning letters on the pharmaceutical industry, we ideally need to know the entire expected changes in cash flows for each firm owing to changes in its internet marketing campaign. However, these data are impossible to get or even reasonably

Table 1: List of firms

Ticker	*Name*	*Receive letter*	*Market value (27 March 2009)*
BIIB	Biogen Idec Incorporated	Yes	15358.66
CEPH	Cephalon Incorporated	Yes	5270.17
FRX	Forest Labs Incorporated	Yes	6569.72
GSK	GlaxoSmithKline Plc ADR	Yes	75780.84
JNJ	Johnson & Johnson	Yes	148008.5
LLY	Lilly Eli & Company	Yes	37006.57
MRK	Merck & Company Incorporated	Yes	57397.23
NVS	Novartis AG ADR	Yes	84634.23
PFE	Pfizer Incorporated	Yes	94615.56
RHHBY	Roche Holding Limited ADR	Yes	113294.5
SNY	Sanofi-Aventis SA ADR	Yes	71445.55
ABT	Abbott Laboratories	No	72943.91
AMGN	Amgen Incorporated	No	54800.65
AZN	Astrazeneca Plc ADR	No	46853.86
BMY	Bristol-Myers Squibb Company	No	57401.79
SGP	Schering-Plough Corporation	No	40948.12
WYE	Wyeth	No	39526.46

There are three firms that received the letter that are not in the sample: Boehringer Ingelheim Pharmaceuticals and Genentech. Boehringer Ingelheim Pharmaceuticals, Inc. is the pharmaceuticals unit of Boehringer Ingelheim Corporation, which is the US headquarters of Germany's Boehringer Ingelheim. Bayer is headquartered in Germany. There is no listing for the firm in US markets. Genentech was acquired by Roche in March of 2009.

This table contains a list of firms analyzed within each category. Market value is in millions of dollars.

estimate. Given the early stage of adoption of internet marketing by the pharmaceutical industry, its possible impact and direction are impossible to determine. The warning letters may also cause internet marketing to change in ways that are unanticipated right now. If the market anticipates that a ruling would cause a decrease in overall drug consumption, the stock price reaction to all the firms should be negative. If the market thinks that overall drug consumption will remain the same, then curtailment of internet marketing should adversely affect those firms that were planning to become more dependent on internet marketing. To avoid these peripheral complications, we looked at the reactions of both groups of firms.

Event study methodology

As described in Fama (1970)[28] the event study methodology used assumes that financial markets incorporate new information with relative expediency and thus are semi-strong form efficient. We categorize firms depending upon whether or not they were recipients of the letter from the FDA. Assuming that the regulation impacts the whole pharmaceutical industry, we expected to find a similar reaction (albeit possibly a smaller one) for the firms that did not receive the warning letters.

Our analysis used a standard event study methodology similar to that of Dodd and Warner[29] and Travalos.[30] We obtain the stock price data from StockVal a financial data and software provider. We use the S&P 500 as our market index.[31] We employ single market model:

$$R_{it} = \alpha_i + b_i R_{mt} + \varepsilon_{it} \quad (1)$$

where R_{it} represents the returns of security i on day t, R_{mt} is the return on the index on day t and b_i is the sensitivity of the stock to the index. The coefficients are estimated using an ordinary least square regression model. The estimation period starts 150 trading days before the event date, and ends 31 days before the event date. The estimates are used to generate abnormal returns during the prediction period from -1 to $+1$ trading days (2 April – 4 April) around the announcement, where the posting date (3 April 2009) is defined as day 0. Table 2 shows the event horizons. Abnormal stock returns are calculated by taking the difference between actual and expected returns from the market model. The average of these returns across the sample of firms constitutes average abnormal return:

Table 2: Event horizon

Date	*Action*
2 April (Day 1)	FDA released the letters
3 April (Day 0)	FDA posted the letters

Pfizer announced, on 2 April, that its experimental drugs in testing had shrunk by 12 per cent in the previous 6 months. This table contains events and dates for the warning letters.

$$AR_t = \frac{1}{N}\sum_{i=1}^{N}[R_{it} - \hat{\alpha}_i - \hat{b}_i R_{mt}] \quad (2)$$

where AR_t is the average abnormal return for the sample on day t, N is the number of firms in the sample, R_{it} is the return on security i on day t, R_{mt} is the return on the S&P 500 on day t and $\hat{\alpha}_i$ and $\hat{b}_i$ are the estimates of market-model parameters. The average cumulative abnormal return is calculated by summing the abnormal returns over the interval from day -1 to day $+1$. Again, we assume there is no leakage of the decision before the public announcements and thus are interested in the $(-1, +1)$ window:

$$CAR_{(-1,+1)} = \sum_{t=-1}^{+1}[AR_t] \quad (3)$$

where CAR_t is the cumulative abnormal return for period $(-1$ to $+1)$.

RESULTS

We examine the reaction of stock prices of pharmaceutical firms around the FDA decision; specifically on 2, 3 and 4 April.

Letter firms

We first analyze the firms that did receive the letters from the FDA. The results are presented in Table 3. On 2 April, the FDA announced the release of warning letters. The results showed positive raw and insignificant negative abnormal returns for the 'Letters' firms on 2 April. A firm-by-firm analysis shows that eight of the 11 firms have negative abnormal returns on 2 April. The results are similar upon exclusion of Pfizer from the sample. The results show that the market did not react adversely to the announcement on 2 April. We expect this is owing to the limited distribution of news on 2 April. We find significantly negative results on 3 April, when the letters were posted. The average abnormal return on 3 April was −3.18 per cent and was significant at 1 per cent level. If we exclude Pfizer, the average abnormal return was −3.26 per cent, significant at 1 per cent level. All the sample firms have negative returns. The average raw returns were also negative for all firms. There is insignificant reaction on 4 April, and an overall significantly negative reaction from 2 April to 4 April. The total market capitalization of these 11 firms is approximately US$709 billion. Using the abnormal returns, the loss of value over the 3-day period to the 11 firms was $27.3 billion. Excluding Pfizer, the market value of the remaining 10 firms is $615 billion, and the loss of value for the 10 firms is $23.1 billion. This suggests that investors positively value the role of search engine-based internet marketing to pharmaceutical firms.

No letters

We further analyze the impact of the decision on the firms that did not receive

Table 3: Stock return of 'letters' firms

Name	*Ticker*	*Raw*				*Abnormal*			
		2 April (%)	*3 April (%)*	*4 April (%)*	*CR(%)*	*2 April (%)*	*3 April (%)*	*4 April (%)*	*CAR(%)*
Biogen Idec Incorporated	BIIB	0.61	−3.67	−1.38	−4.43	−1.77	−4.68	−1.07	−7.51
Cephalon Incorporated	CEPH	1.64	−2.24	0.09	−0.51	0.27	−2.81	0.30	−2.24
Forest Labs Incorporated	FRX	3.49	−2.72	−1.23	−0.46	1.53	−3.37	−0.62	−2.46
GlaxoSmithKline Plc ADR	GSK	1.12	−1.02	−2.44	−2.34	−0.63	−1.61	−1.90	−4.14
Johnson & Johnson	JNJ	−0.13	−1.56	0.10	−1.60	−1.86	−2.18	0.55	−3.49
Lilly Eli & Company	LLY	0.35	−2.66	−0.52	−2.82	−2.14	−3.58	0.10	−5.62
Merck & Company Incorporated	MRK	0.04	−2.02	0.79	−1.19	−2.61	−3.04	1.34	−4.30
Novartis Ag ADR	NVS	0.39	−2.16	−0.80	−2.57	−1.07	−2.64	−0.34	−4.05
Pfizer Incorporated	PFE	−1.59	−1.61	1.17	−2.02	−3.85	−2.42	1.76	−4.51
Roche Holding Limited ADR	RHHBY	3.97	−4.81	−0.79	−1.62	3.18	−5.00	−0.40	−2.22
Sanofi-Aventis Sa ADR	SNY	2.12	−2.69	−0.40	−0.97	−0.47	−3.70	0.13	−4.05
Average	11	1.09**	−2.47***	−0.49	−1.87***	−0.86	−3.18***	−0.01	−4.05***
Average without PFE	10	1.36**	−2.56***	−0.66**	−1.85***	−0.56	−3.26***	−0.19	−4.01***
	S&P 500	2.81	0.96	−0.82	2.96	0.00	0.00	0.00	0.00

**, ***indicate a 5 per cent and 1 per cent level of significance, respectively. Averages are calculated from original unrounded numbers.

This table contains raw returns of firms that did receive a letter. The CR and CAR are from 2 April to 4 April.

the warning letter. If the warning letters were to impact the whole industry the effect should be consistent for 'No Letters' firms as well. The results for the 'No Letters' firm are presented in Table 4. The results show that the imposition of warning letters on internet marketing has a significant negative effect on the stock prices of pharmaceutical firms. The returns are significantly negative on both day −1 and day 0 (2 and 3 April). The returns are insignificant on day +1 (4 April) and significantly negative for the window −1 to +1 (2 April – 4 April). The total market capitalization of these six firms is approximately $312 billion. Using the abnormal returns, the loss of value over the 3-day period to the 11 firms is $18.40 billion. The results suggest that market treated the warning letters as an industry event rather than a firm-specific event. The negative results show that internet marketing has a net additional positive effect and not just a substitution effect. Further, the results imply that consumer behavior is affected by search engine marketing. Some caution is warranted in interpreting these results, for several reasons that are discussed below.

LIMITATIONS

This study is limited in many respects. First, the study only analyzed publicly traded firms in both groups that traded in US stock market. Though the firms included in the study represent more than 80 per cent of the market share in US, they do not represent all. Second, we use the FDA's warning letters against search engine marketing, which is one of several ways to market on the internet. Third, we studied the wealth impact of the warning letter for few days around the warning letters. This provides a quick reaction to the impact of the warning letter and in no means a comprehensive analysis of the reaction to the warning letters. Fourth,

Table 4: Stock return of 'no letters' firms

Ticker	*Name*	*Raw*				*Abnormal*			
		2 April (%)	*3 April (%)*	*4 April (%)*	*CR(%)*	*2 April (%)*	*2 April (%)*	*4 April (%)*	*CAR(%)*
Abbott Laboratories	ABT	−2.87	−2.82	−1.74	−7.42**	−4.48**	−3.47*	−1.47	−9.42**
Amgen Incorporated	AMGN	−2.18	−1.53	2.69	−1.02	−4.48*	−2.46	3.09	−3.84
Astrazeneca Plc ADR	AZN	−1.23	−1.48	0.51	−2.20	−3.36	−2.23	1.09	−4.50
Bristol-Myers Squibb Company	BMY	−2.96	−5.59**	1.67	−6.88*	−4.94*	−6.41**	1.97	−9.38**
Schering-Plough Corporation	SGP	0	−0.68	0.38	−0.30	−2.71	−1.80	0.78	−3.73
Wyeth	WYE	−1.09	−0.21	0.05	−1.25	−3.59	−1.27	0.37	−4.49
	Average	−1.72*	−2.05**	0.59	−3.18**	−3.92***	−2.94**	0.97	−5.89***
	S&P 500	2.81	0.96	−0.82	2.96	0.00	0.00	0.00	0.00

*,**, ***indicate a 10 per cent, 5 per cent and 1 per cent level of significance, respectively. Averages are calculated from original unrounded numbers.
This table contains raw returns of firms that did not receive a letter. The CR and CAR are from 2 April to 4 April.

we do not have information on the internet marketing activities or budgets for these firms. The reaction may be dependent on the amount of internet marketing being done or proposed at a specific firm. Fifth, we assume that the returns on these days are due to the FDA's announcement. Given that new information in the health-care sector is continually generated, it may be wrong to attribute these returns to 'internet marketing' alone. The study also fails to consider any societal impact. In particular, the question of whether internet marketing helps consumers become more educated is not taken up in this study. It would be interesting to follow this with a study on the efficacy of internet marketing in educating the consumer. Lastly, it would be interesting to look at the sales and market share of various drugs and any changes that appeared after the FDA letters.

DISCUSSION

This study investigates the stock market reaction to the FDA's releasing and posting of warning letters to pharmaceutical firms on the internet marketing practices. The results indicate that the shareholders of pharmaceutical companies see the value of internet marketing for the whole industry. This is evidenced by the fact that both groups of firms, those to which the letters were sent and those to which the letters were not sent, declined in market value as measured by their stock performance. Even if the reaction might be an overreaction to the news, still the direction of the reaction tells us that markets find value in internet marketing.

There are several implications of our results. First, based on Mahattan Research an estimated 100 million consumers, or 44 per cent of the US population, use online to search for pharmaceutical information in 2009, which has tripled in the past 5 years.[32] By 2012 it is estimated that majority of the US adult consumers would use internet for seeking information about pharmaceuticals from the internet. Similarly, about 99 per cent of the physician population in the United States use internet to seek information related to their practice. These trends show that the future communication strategy for the pharmaceutical industry should involve online. The results from the study clearly indicate that when the warning letters were issued by the FDA, the market sensed uncertainty related to the ability of the pharmaceutical industry to use internet to communicate with the customers, that it could compromise the ability of the pharmaceutical industry to create shareholder's value and thus the negative reaction on the stock market. These phenomena validate that in the twenty-first century internet is indispensible for pharmaceutical companies to communicate value of their products to their customers, the physicians and patients.

Second use of internet search engines is only one aspect of electronic media available for pharmaceutical companies to communicate with consumers. With the explosion of new interactive technologies such as online ads (that is banner on third-party websites), email marketing, webinars, podcasts, vodcasts, video on demand, mobile, wikis, Really Simple Syndication (RSS) feeds, viral video (for example YouTube), blogs, virtual worlds (that is second life) and social networking applications such as MySpace, Facebook and Twitter, the current and future world of communication is becoming radically and fundamentally changed. A key question is that does the existing guidance provided by the FDA to the pharmaceutical industry to presenting information for prescription drug

promotion adequate? Does existing guidance provided on what is considered fair balance adequate and appropriate give the evolution of new technologies as discussed above? The guidance document published by the FDA in May 2009[33] provides very valuable and useful guidance to pharmaceutical industry in sharing risk information with their customers but did not provide adequate guidance on the use of online technologies. The following sentences are from the guidance document:

> Some print formatting issues also apply to non-print promotion such as videos, broadcast ads and similar audio visual pieces. However, the unique features of non-print media add complexity. As with print FDA considers factors such as location, proximity, type size, type style, and contrast when evaluating these materials.

Does this mean that FDA will continue to use fair balance requirements as it stipulated for the print and broadcast media? FDA recognizes that the non-print media adds complexity, but as the social media becomes more dominant mode of communication in the future how can pharmaceutical companies use the technologies to effectively educate the customers? The importance of the internet warrants better guidance from the FDA.

Third, research indicates that firms that have a first mover advantage on the internet would have competitive advantage that is real.[34] It is imperative that pharmaceutical companies that strive for competitive advantage on the online space should work with the FDA to develop guidelines for internet marketing that will assuage the FDA's concerns but also effective in online communication strategies. The recent public hearing conducted by the FDA might lead to further guidance to the pharmaceutical industry, which could benefit the industry by minimizing ambiguity in guidance related to use of internet, social media and other internet-based tools for communicating with the customers. Pharmaceutical firms should also work with search engine companies to resolve the limited number of characters available to communicate risk information on the search engines. It would also be beneficial if they were to negotiate to get search engines to offer better methods to display risk information or engage the search engine companies to co-develop unique methods to meet the fair balance requirements of the FDA.

On 9 November 2009, PhRMA, the trade organization for the pharmaceutical industry, published in their website three key suggestions/modifications of standards for the internet marketing to the DDMAC.[32] They were: (1) 'The FDA should adopt a prominent universal safety symbol – the FDA logo or other FDA-approved symbol – to indicate that a linked page contains the manufacturer's FDA-regulated risk information'. This symbol would distinguish official FDA approved information from other unapproved commentary or data and provide credibility to the health-care professionals and patients. (2) 'Because millions of Internet users are already accustomed to viewing pop-ups, mouse roll-over text, hyperlinks and other new media communication tools, the FDA should follow the lead of the FTC in recognizing the space limitations of certain formats and the flexibility of the Internet in communicating warnings'. (3) 'Just as FDA and the White House have embraced certain Internet technologies that emphasize brevity, such as blog entries and Twitter™, the Agency should facilitate the use of such technologies by biopharmaceutical manufacturers. For example, FDA should facilitate communication of abbreviated

benefit and risk information, provided there is easy access to longer, comprehensive warnings through a prominently labeled hyperlink. The Agency could, for instance, facilitate the ability of manufacturers to combine brief "introductions" to a health topic with prominent and clearly marked links that would provide access to the prescription medicine's full indication and comprehensive risk information. Similarly, such information could be provided using roll-over or pop-up technology'. These suggestions can assist in meeting the FDA's fair balance requirements in the constantly evolving complex technological environment.

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