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# Brand Buzz in the Echoverse

Kelly Hewett, William Rand, Roland T. Rust, and Harald J. van Heerde

**Report Summary**

Social media have created a reverberating "echoverse" for brand communication, forming complex feedback loops between corporate communications, news media, and user-generated social media. The nature of brand communications has been transformed by online technology, as corporate communications moves increasingly from one-to-many (e.g., advertising) to one-to-one (e.g., Twitter) while consumer word-of-mouth moves increasingly from one-to-one (e.g., conversations) to one-to-many (e.g., social media).

Focusing on the four leading firms in the financial services industry, Kelly Hewett, William Rand, Roland Rust, and Harald van Heerde use text mining approaches and computational linguistics techniques to measure the volume (quantity) and valence (positivity) of traditional media news stories, online word-of-mouth, and firm communications (corporate social media, advertising, and press releases) over the period 2007-2014. These communications are then related to a measure of consumer sentiment and further linked to retail business outcomes, using econometric methods. Additional insights about the nature of the echoverse and the meaning of the empirical results are gained from in-depth qualitative interviews with 13 brand communications executives.

Based on statistical analysis of this comprehensive brand communications dataset, the authors find that the echoverse exists; feedback loops can be found between all of these brand communication sources. Furthermore, the echoverse has intensified as online word-of-mouth has become more prevalent. Analysis splitting the data into early (2007-2010) and late (2010-2014) shows that social media have become increasingly influential in driving brand outcomes, and that the traditional news media have become more responsive to online word-of-mouth.

In general, the evolving echoverse requires rethinking brand communication strategies, with online communications (both consumer and firm) becoming increasingly central. With regard to specific managerial implications, the authors conclude that a personalized social media strategy, focused on responding to individual customers, may be more effective than a "broadcast" social media strategy that is essentially using social media posts as press releases or advertising. Results also indicate that a consistent, moderately-toned corporate social media strategy may be more effective than a more inconsistent, strongly-toned (positive) strategy.

With regard to more traditional brand communications tools, the authors find that a press release strategy that is responsive to media news stories can be effective to the extent it does not directly reflect negativity in the stories. Also, advertising shows only a short-term impact on business outcomes. Over-reliance on advertising may therefore be ineffective, as other communication elements (e.g., online word-of-mouth) appear to have a larger impact. Finally, the authors conclude that traditional consumer sentiment measures (e.g., ongoing brand tracking studies) appear to be growing less predictive of business outcomes, as online word-of-mouth becomes more predictive.

*Kelly Hewett is Assistant Professor of Marketing, University of Tennessee. William Rand is Assistant Professor of Marketing and Computer Science and Roland T. Rust is Distinguished*

*University Professor, both at Smith School of Business University of Maryland. Harald J. van Heerde is Research Professor, Massey Business School, Massey University, New Zealand.*

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**Introduction**

The explosive growth of social media has dramatically altered the brand communications environment. Traditional brand communications vehicles such as advertising, press releases and news stories have been joined by online word-of-mouth (e.g., Twitter and Facebook) which amplifies word-of-mouth's overall influence. Companies also have joined the online word-of-mouth arena through channels such as corporate Twitter accounts and Facebook pages. Companies everywhere are trying to figure out exactly how the brand communications environment has changed, what drives business outcomes in this new environment, and what brand communications strategies work best. We view the new brand communications environment as a reverberating "echoverse" in which consumer-generated brand buzz plays an important role.

Our research broadly addresses three main research questions:

1) Does the echoverse exist? That is, do communications from each communications source actually echo in all the others? And if so, what is the nature of the echo?
2) Has the echoverse changed as social media have grown? In other words, have the relationships between the various communication sources, customer sentiment, and business outcomes changed over time, with some becoming more significant and some less?
3) Are some companies managing the echoverse better than others? If so, can we understand what they are doing right (or wrong)?

Our approach is to build an extensive longitudinal database of brand communications data in the U.S. financial services industry, since this industry has experienced dramatic brand-related events in the last decade. Focusing on the four leading firms in the industry, we use text mining approaches and computational linguistics techniques to measure the volume and valence of traditional media news stories, online word-of-mouth and firm communications. We relate these communications to a traditional measure of consumer sentiment and further link them to business outcomes using econometric techniques. The quantitative analysis is augmented with insights gained from in-depth qualitative interviews with 13 brand communications executives.

We empirically document all the feedback loops in which corporate communications, news media, consumer communications and consumer sentiment all echo each other and feed back on themselves. We show that the echoverse has intensified over time and that the impact of online

word-of-mouth is real and increasing. We document that one-to-many corporate communication (e.g., advertising) may be less effective in the modern online environment, but that one-to-one corporate communication (e.g., direct responses to individual customers via social media) may be more effective. By contrast, customer communication has trended in the opposite direction, as one-to-many communication has become possible using social media.

We find substantial variation in firms' approaches to brand communications and the effectiveness of their actions. In an exploratory investigation of firms that are effective or ineffective, we find that (1) a press release strategy that is positively responsive to news stories may help drive positive online word-of-mouth; and (2) a personalized, high-volume, consistent, moderately toned Twitter strategy can effectively manage consumer sentiment.

Marketing managers have traditionally focused on influencing consumer sentiment and subsequently performance, via advertising and other communications investments. However, the growth in social media offers to marketers, consumers, and other parties in the brand communication environment (e.g., the print news media) a greater voice to influence the discourse. On the one hand, having an alternative to traditional approaches with the ability to potentially engage in a one-on-one dialog with members of the echoverse, creates an opportunity for greater influence. On the other hand, social media may increase complexity for marketers managing their brand strategies and ultimately figuring out how to improve performance. Marketers increasingly must expend resources on both monitoring the discourse from these sources and determining whether and how to modify their traditional communications approaches. This study offers insights that about how marketing managers could have a greater impact on consumer sentiment, and ultimately on firm performance.

Previous research on the brand communications environment has focused largely on the interplay within either the firm communications-traditional news media relationship or firm communications-consumer sentiment relationship, and primarily on each relationship in a single direction. For example, much of the research in this domain has focused on how brand harm crises, typically involving negative publicity in the media, impact firm performance (Chen, Ganesan and Liu 2009; van Heerde, Helsen and Dekimpe 2007), how firms respond to traditional news media (Choi 2012; Cleeren, van Heerde and Dekimpe 2013), how news media respond to firm communications during such crises (An, Gower and Cho 2011), or how consumers respond to either firm communications or traditional news media (Ahluwalia, Burnkrant and Unnava

2000; An 2011; Coombs and Holladay 2008; Coombs and Holladay 2014; Dawar and Pillutla 2000; Klein and Dawar 2004; Lei, Dawar and Gurhan-Canli 2012; Naylor, Lamberton and West 2012; Perkins and Forehand 2012; Pullig, Netemeyer and Biswas 2006; Zhao, Zhao and Helsen 2011). Other research examines how marketing communications, e.g., advertising, can affect firm performance (Dekimpe and Hanssens 1995; Steenkamp and Fang 2011; Wang, Zhang and Ouyang 2009) or the impact of consumer word-of-mouth (WoM) on firm performance (Corstjens and Umblijs 2012; Tirunillai and Tellis 2012).

There is also a growing related body of literature on the role of consumer WoM in an age where digital media and customer relationship management (CRM) have become more prominent; the focus in many of these studies is the relationship between online WoM and consumer sentiment (Berger and Iyengar 2013; Goldenberg, Oestreicher-Singer and Reichman 2012; Hamilton, Vohs and McGill 2014; Moe and Schweidel 2012; Stephen and Toubia 2010; Toubia and Stephen 2013; Trusov, Bucklin and Pauwels 2010) or between firm communications and online WoM (Kumar et al. 2013). In addition, research in this domain has also begun exploring the direct impact of WoM (both consumer and firm-generated) on performance (Chevalier and Mayzlin 2006; Godes and Mayzlin 2009; Godes and Mayzlin 2004) and how earned and owned media, including social media, influence sales (Stephen and Galak 2012). Research in both the consumer behavior (McQuarrie, Miller and Phillips 2013) and communications (Gaullagher and Ransbotham 2010) literatures also explores the notion of the "megaphone effect," which represents the ability of social media to amplify individuals' messages and attract the attention of others in an online community.

While the literature has made significant headway in understanding the interplay between various actors in the brand communication environment, and related concepts such as the megaphone have been addressed, this study is the first to take into consideration how the entire environment in which the firm operates can influence its brand and ultimately performance. Figure 1 provides a summary of recent work in each of these areas, and highlights the position of our study in terms of its contribution (Figures follow References throughout.). We list studies in Figure 1 in accordance with the components of the communications environment they address -- whether firm communications, news media, or online WoM, or some combination of the three. In addition, we note whether each study includes either consumer sentiment or firm performance as an outcome (or both, as in this study).

The rest of this paper is organized as follows: first using executive interviews we build a conceptual framework for the echoverse; next we iterate how we built the dataset and analyzed the data; then we provide results and conclude by exploring their implications.

## Conceptual Framework

### Executive interviews

To understand the changing brand communications environment better, we conducted in-depth executive interviews to augment our econometric analysis. These interviews inspired the concept of an echoverse and gave us managerial insights to better understand the empirical results. The first author conducted 13 interviews across a variety of industries because we believe the idea of the evhoverse is generalizable across any domain in which brand communications are managed (For a list of their characteristics, see Appendix 1.) Each interview ranged from 40 to 60 minutes. We followed a process similar to what has been described as a hermeneutic circle (Thompson, Pollio and Locander 1994). First, we used accepted practices for constructing codes and developing themes across the interviews by using QSR International's NVivo software to manage the transcriptions (more than 100 pages of single-spaced text) and notes (Corbin and Strauss 1990; Spiggle 1994). Next, transcription analysis led to key initial insights that subsequently informed follow-up conversations with several informants, discussions among the research team, and consideration of articulations with existing literature. We switched back and forth between the informants' narratives and the academic literature, exploring different aspects of the brand buzz phenomenon. Our analysis ended when we were satisfied that we had exhausted the relevant theoretical insights that could be extracted from our sample and that additional informant narratives would be unlikely to extend our understanding significantly.

Below we draw executives' insights about the nature of the echoverse. More specific insights are drawn later in the paper with respect to interpreting and understanding the empirical results from the quantitative study. Individual participants were given fictitious names to protect their identities with the exception of two participants who permitted us to use their names and affiliations.

**The Echoverse**

Our interviews lead to a number of key inferences resulting from the themes and connections represented in the data (Spiggle 1994). First, our interview results suggest that the overall scope of the brand communications environment is comprised of three key components that contribute discourse: the firm's communications (advertising, press releases, and contributions to social media), traditional media news articles, and online word of mouth (WoM). Paul, a senior communications executive in the financial services industry, explains the the complex nature of the interrelationships in this brand communication environment:

> "media is an echo chamber and you have advertising that is perceived one way, news perceived another way, and social media perceived yet another way and they are [of] different durations. . . . It's this interplay between social media, publicity, and advertising. Companies just need to be better at understanding the interplay between these three because it's an echo chamber."

This notion of an "echo chamber" is reiterated throughout the respondents' narratives. It is consistently described as omnidirectional, with each component responding to the others. Based on the centrality of this echo chamber metaphor to managers' understanding of how brand buzz works, we refer to this interactive brand communications environment, with feedback loops among all components, as well as reinforcing mechanisms for each component, as the brand "echoverse" (Figure 2).

Another key theme that emerges is marketers' role in the echoverse as both observers and participants. The reverberating nature of communications in the echoverse creates unpredictability and the need for firms to understand the potential performance implications as communications about their brand or firm are amplified. Howard, a senior PR executive in a global retail firm indicates that his company's communications philosophy handbooks "has things in there like 'Know who has the microphone.'" He further discussed how his firm decides when to "grab the microphone" to increase the volume of its own brand messages. This notion of firms both monitoring and contributing to the echoverse is reaffirmed throughout our narratives. Charles, a PR executive working with numerous Fortune 50 firms, describes contributions to the echoverse as critical for firms' brand strategies. "If there is a lot of conversation about your brand, whether it's positive or negative, you best be contributing to that conversation in some way." Thus, in the modern brand communications environment, each component can influence the conversation. This creates complexity for firms attempting to both monitor and influence the

discourse regarding their brands. To help us understand the echoverse's complexity in more detail, we conducted a quantitative study.

## Method

### Data and sources

We tested our conceptual framework in the financial services industry. Using consumer deposits as our metric, we narrowed that focus by identifying the four top U.S. financial service firms: Bank of America, Citibank, J.P. Morgan Chase, and Wells Fargo, and we limited our scope to 2007-2013. This period in banking was particularly tumultuous. Changes in legislation, the face of the competitive landscape, the mortgage crisis and the subsequent Global Financial Crisis, as well as the rapid growth of social media, worked together to create an environment rife with challenges and opportunities for a range of stakeholders to participate in the discourse. Thus, we expected the volume in the echoverse from all three components to experience high volatility at different periods. In addition, the challenges for managing brand perceptions and firm performance during this period were extreme; thus our findings are particularly relevant for marketing managers.

The components of the echoverse and the data used to represent their participation are described below. We include a description of both the sources and the processes used to prepare and analyze each source.

*Traditional media news stories.* Using the Factiva database (Dow Jones), we captured news publications mentioning any of the four focal banks during the time period of our study. This source accesses the world's top media outlets, including offline publications and web sites. Due to frequent duplication of articles, we limit our universe of articles to those published by one or more of the top 25 media outlets based on average circulation figures across our time frame, obtained from the SRDS database (Kantar Media). In addition, several communications industry experts we interviewed advised that these top 25 outlets comprise the vast majority of news coverage. In addition, these experts counseled us that one primary news channel (print) would be sufficient, given the likelihood that the same stories would appear in other channels, e.g., television and radio. As George, the PR metrics expert, explains, "the influence of one media channel on another is so rapid, . . . if anything were hypothetically released only through a TV

news channel that information would be picked up so quickly by the other channels that you don't need to have the television news in any model." Circulation figures for these outlets enabled us to assess reach for each published article. Our analysis was conducted on the 14 accessible publications via Factiva in the top 25; the remaining 11 were unavailable due to Factiva academic licensing restrictions. For a list of the analyzed publications, see Appendix 2.

We then classified these articles (a total of 65,261) based on the banks mentioned in the news article, which enabled us to count articles for multiple different banks when the article mentioned more than one. The resulting text was run through the Linguistic Inquiry and Word Count (LIWC) (Pennebaker and Francis 1996) software to extract quantitative data about the underlying text. LIWC reads in each file word-by-word and then attempts to match each word against a dictionary of words that are defined for different types of words, such as positive and negative emotional, money-related, and anger words. LIWC outputs 80 different measurements of the underlying text that vary from general descriptors (e.g., total word count) to linguistic elements (e.g., auxiliary verbs) to psychological constructs (e.g., cognitive words).

In this study, we focus primarily on the valence and volume of news articles. For each news article, we obtained the percentage of positive and negative words using LIWC. We then weighted the articles by the outlet's weekly circulation to obtain a weighted percentage of positive and negative words (e.g., 3.1% and 1.1%, respectively). We finally created a weekly valence score by subtracting the weighed negative word percentage from the weighed positive word percentage (3.1%-1.1%=+2% in the example).

*Online WoM*. Twitter data is a particularly useful proxy for social media during this timeframe. As opposed to Facebook, which contains more personal conversation, Twitter tends to be focused on information sharing along with communications directly between consumers about the firms they are interacting with (Kwak, Lee and Moon 2010). Moreover, since the default nature of Twitter is that all tweets are public, they are more likely to have a larger broadcast-like effect on consumer decisions than Facebook conversations where the default is that all communications are private. Finally, Twitter data are publicly available for a limited time, and historical Twitter data can be purchased; this means that studies about Twitter data are inherently replicable, whereas with other forms of social media data that are more proprietary, data can be difficult to obtain, and as a result findings can be difficult to reproduce. For all these

reasons we captured online WoM activity for each of the focal banks via tweets mentioning at least one of the focal firms over the time period of our study

We purchased the raw tweets directly from Gnip (now owned by Twitter). We provided Gnip with a list of matching phrases they then used to pull all tweets that matched those terms for the time period of our study, for a total of 18,577,733. We then aggregated these data into weekly counts either from the company or about the company, which allows us to track separately whether the tweets are firm created or created about the firm by others. We also used a standard Twitter sentiment analysis tool (Go, Huang and Bhayani 2009) to score each individual tweet as either positive or negative on a scale of -1.0 to 1.0. We then averaged the positive tweet values and negative tweet values separately over each week. For example, there may have been 800 positive tweets with an average valence of +0.6 and 200 negative tweets with an average valence of -0.3. We then weighted these values by the number of positive and negative tweets to obtain the weekly Twitter valence score for that bank in that week. In the example, the valence score would be (800*0.6+200*-0.3)/1000 = 0.42. Hence we end up with four Twitter-based measures: (public) online WoM volume and valence, and company Twitter volume and valence.

*Consumer sentiment*. Consumer sentiment was assessed via an attitudinal index, the BrandIndex database (YouGov). The interviewed industry experts identified YouGov's BrandIndex as a key source of consumer sentiment data leveraged by brand communications managers. George explains that this source allows firms to "get much better survey results" than in the past and from other sources. Using this database, we captured weekly reporting of the BrandIndex overall buzz metric, calculated as the percentage of respondents who heard or saw something positive or negative about a brand in the past two weeks. The net score is between -100% (all respondents report negative buzz) and +100% (all respondents report positive buzz).

*Firm communications.* We captured the firms' participation in the echoverse via several sources. First, from the banks' websites we compiled all press releases issued between 2007 and 2013. The data were aggregated by week. A total of 5,376 press releases were encoded in Word format, which we converted into plain text files using the opendocx Python module (https://pypi.python.org/pypi/docx). The date of the press release was automatically pulled from the documents via regular expression matching using Python code. We then processed this data through LIWC in a similar fashion to the approach used for the news articles. In the majority of

our analysis we used the positive and negative emotional values output by LIWC, and in a follow-up analysis we used a more fine-grained filter. We also recorded the number of press releases reported by each bank each week. We then used the positive and negative emotion percentages to create a valence score by subtracting the negative word percentage from the positive word percentage.

Next, to assess the level of overall advertising spend for each of the focal firms we used the Ad$pender database (Kantar Media). This database reports monthly levels of advertising spend at the firm level. Lastly, we captured the focal firms' participation in social media via tweets originating from all firm-sponsored Twitter accounts as described above.

*Business outcomes.* Because of the consumer's key role in the echoverse, we sought a performance metric that would closely represent customer behavior. A key outcome used in marketing ROI models is the level of deposits held; this is linked very closely with customer behavior and less impacted by factors such as firm income adjustments due to write-offs, lawsuits, etc. Additionally, "core deposit growth drives net interest income growth, and net interest income growth drives earnings growth" (BernsteinResearch 2014). As such, deposits represent a key indicator of future performance of retail banks. Thus using Bloomberg, we captured business outcomes via the level of deposits held by each of the focal firm.

**Econometric modeling**

We now discuss how we model the relationships among the variables in the echoverse. Then we explain how we study the link between the echoverse and business outcomes. For both aspects we use a model in the VAR (Vector Autoregressive) tradition because it allows us to treat all variables as endogenous, consistent with the nature of the echoverse.

*Unit root tests*. In a first step, we test whether variables in the echoverse are stationary or evolving. We use a panel data unit root test where we stack each variable across the four banks, allowing for different unit root processes across banks. For all ten variables, the Augmented Dickey Fuller test for panel data rejects the null of a unit root ($p<.05$). Hence we find no evidence for unit roots and all variables enter the model in levels.

*Hierarchical VAR Model*. To study the interrelationships between the variables in the echoverse, we needed a model that treats all variables as endogenous, because each variable can impact each of the other variables. This impact can be instantaneous (same period) or lagged

(later periods). We also needed to allow for heterogeneity between banks, because there may be between-bank differences in the way the variables respond to each other due to factors such as differences in the customer bases of banks. At the same time, there may be some commonality across banks in the way pairs of variables respond to each other. For example, there may be a general pattern in how news media responds to what happens in the Twittersphere or to firm communication activities. To address each of these requirements, we developed a Hierarchical Vector Autoregressive (VAR) model where all variables in the echoverse are modeled as endogenous variables:

$$\begin{pmatrix} \text{News Article Volume} \\ \text{New Article Valence} \\ \text{Consumer Sentiment} \\ \text{Public TwitterVolume} \\ \text{Public Twitter Valence} \\ \text{Company TwitterVolume} \\ \text{Company Twitter Valence} \\ \text{Press Release Volume} \\ \text{Press Release Valence} \\ \text{Advertising Spend} \end{pmatrix}_{\text{bank } b,\text{week } t} = \sum_{l=1}^{L} B_{bl} \begin{pmatrix} \text{News Article Volume} \\ \text{New Article Valence} \\ \text{Consumer Sentiment} \\ \text{Public TwitterVolume} \\ \text{Public Twitter Valence} \\ \text{Company TwitterVolume} \\ \text{Company Twitter Valence} \\ \text{Press Release Volume} \\ \text{Press Release Valence} \\ \text{Advertising Spend} \end{pmatrix}_{\text{bank } b,\text{week } t-l} + e_{bt} \qquad (1)$$

The variables are operationalized in Table 1 (Tables follow References throughout.). We have 343 weekly observations between July 2007 and July 2013 for the estimation of model (1). Table 1 shows the descriptive statistics.

Model (1) captures the contemporaneous effect between variables through the error term $e_{bt} \sim N(0, V_1)$, where $V_1$ is a full (10 by 10) covariance matrix. The lagged effects (up to lag L) are captured by the first term on the right-hand side of (1). $B_{bl}$ is a full (10 by 10) matrix with regression coefficients, with elements $B_{blij}$ for the effect of variable *i* on variable *j* with lag *l* for bank *b*. Based on the Schwarz BIC Criterion, a lag of L=1 is optimal.

To allow for commonality in response parameters across banks, we specify a hierarchical prior such that each brand-specific element is drawn from a population-level mean: $B_{blij} \sim N(B_{lij}, V_B)$. We write the model as a Hierarchical SUR model, and we estimate it with Bayesian methods described in Chib and Greenberg (1995), using uninformative priors. We utilize 10,000 draws for burn-in and 10,000 draws for inferences. The chain is well-converged within a few thousand draws.

*Link with business outcomes.* To address the question whether the echoverse matters for business outcomes, we also use a Hierarchical VAR model. As our metric (level of consumer deposits) is reported quarterly (source: Bloomberg), we need quarterly data for the variables that could drive this business outcome. This means that the number of observations is reduced (to N = 27), compared to the weekly data (N=343) we have for model (1). This implies that we have to be somewhat selective in the variables we include.

Based on our theoretical framework, we expect that consumer sentiment will be a key antecedent of the level of customer deposits. If Twitter is increasingly becoming a barometer for consumer mood, the valence of tweets may also drive customer deposits, and hence we also include this variable in the model. We also include advertising in the model because it may drive customer decisions on where to place deposits irrespective of the reverberations in the echoverse.

We use unit root tests for the quarterly time series for the four variables. Consumer sentiment and advertising do not have unit roots ($p$<0.05) based on the Augmented Dickey Fuller test for panel data. However, we cannot reject the null of unit roots for public Twitter valence ($p$ = 0.53) and customer deposits ($p$=0.50). This implies that these two variables will enter the model in first differences, i.e., the current value minus the lagged value, indicated by the symbol Δ. To allow for the endogenous nature of each these variables, we model the quarterly observations for these four variables with a Hierarchical VAR model:

$$\begin{pmatrix} \text{Consumer Sentiment} \\ \Delta\text{Public Twitter Valence} \\ \text{Advertising Spend} \\ \Delta\text{Customer Deposits} \end{pmatrix}_{\text{bank } b,\text{quarter q}} = \sum_{k=1}^{K} C_{bk} \begin{pmatrix} \text{Consumer Sentiment} \\ \Delta\text{Public Twitter Valence} \\ \text{Advertising Spend} \\ \Delta\text{Customer Deposits} \end{pmatrix}_{\text{bank } b,\text{quarter } q-k} + u_{qt} \qquad (2)$$

The error term $u_{qt} \sim N(0, V_2)$, where $V_2$ is a full (4 by 4) covariance matrix capturing same-period effects. We use a hierarchal structure to model the regression coefficients $C_{bkij} \sim N(B_{lij}, V_B)$. Based on the Schwarz BIC Criterion, a lag of K=1 is optimal. We estimate this model with Bayesian methods with the same set-up as for model (1).

## Results

### The echoverse

After analyzing the overall data from 2007-2013, we compare the first half of the time period to the second half and see that the echoverse has evolved. Focusing for now on the full time period, we summarize the model results through Generalized Impulse Response Functions (IRFs), showing the full dynamic impact of a shock in one variable on other variables (Pesaran and Shin 1998). For each of the four banks, we obtain one hundred IRFs, showing the response of ten variables in the echoverse to shocks, applied in turn, to each of the ten variables. We also obtain the IRFs for the hyperparameters, which represent the responses for a representative bank at the population level. In the IRFs, we use the 10,000 posterior draws of the model parameters to obtain the median and 95% and 90% highest posterior densities[1].

We label the effect of a variable on another variable significant if there is at least one period in the IRF with a significant effect (two-sided, at $p<0.1$). Table 2 summarizes the number of significant effects in the population-level IRFs for the representative bank. It shows there is clear evidence for the echoverse, with many significant paths. In particular, there is a clear and symmetric echo between traditional media stories and online WoM, with 75% significant effects both ways. Firm communications have only limited impact on the traditional media (20%) and on consumer sentiment (20% significant) but much more of an effect on online WoM (60% significant). Firm communications respond much more to online WoM (60% significant) than to traditional media stories (10% significant) and consumer sentiment (0%). This finding is in line with the notion that online WoM represents an active, consumer-led voice, whereas traditional media stories are media-led, and consumer sentiment is a more passive consumer voice.

There are also some very interesting asymmetries, such as the finding that consumer sentiment does respond to online WoM (50% significant), but online WoM does not respond to consumer sentiment (0% significant). This is in line with the opinion leadership role of the Twittersphere, as it leads the way the general population (polled for the measurement of

[1] In the early stages of the analyses, we have checked the relationships between the variables using the standard (non-hierarchical) VAR models in Eviews. In- or excluding macro factors such as consumer confidence as control variables did not materially affect the relationships between the variables in the echoverse.

consumer sentiment) changes their minds, and lends credence to the use of online WoM as an early detection tool for consumer sentiment.

Table 3 summarizes the nature of the significant effects in the echoverse. We first discuss the results that hold at the population level, indicated by a bold **P** in Table 3, and a discussion of differences between banks follows. We start in the row for the impact of traditional media. We find that more news articles lead to more online WoM and to a decrease in consumer sentiment. More news articles, and especially ones that are more negative, lead to more negative online WoM. These findings are in line with the notion that traditional media stories, and especially more negative ones, will be picked up by consumers, either actively (through Twitter) or passively (through a decrease in consumer sentiment).

The reverse is also true; news media echo negative consumer sentiment through an increase in the volume of news stories (left bottom cell of Table 3). Table 3 (second row) also shows that online WoM gets picked up in the traditional news media, which holds in particular for negative online WoM. Interestingly, there is still a degree of independence in the media, because online WoM drives the *volume* of news articles but not the *valence*. The volume of online WoM negatively impacts consumer sentiment, in line with the opinion leadership provided by Twitter. Thus, the predominant interaction pattern between the media on the one hand and consumers on the other hand (consumer sentiment and online WoM) is that negative news in particular gets picked up by the other party.

However, when we look at how online WoM responds to itself, we find something quite different: more positive online WoM leads to more online WoM, and vice versa. Thus, within the online WoM domain, the more positive (rather than the more negative) tweets lead to more tweets. This result is also consistent with findings of Berger and Milkman (2012), who show that positive content in social media is more likely to go viral. Berger and Milkman suggest that positive content may more likely to be shared because of an expectation that it reflects positively on the sender.

Many of the significant effects in Table 3 take place in the interaction between online WoM and firm communications. Firms respond to an increase in the volume of online WoM by issuing more company tweets and more press releases. In terms of valence, firms follow an accommodation policy, in the sense that they echo (rather try to reverse) the valence of online WoM. For instance, more positive online WoM leads to more positive press releases and to more

(and more positive) company tweets. Overall, the predominant firm communication tool that responds most strongly to other components of the echoverse appears to be firm-based Twitter communications, followed by press releases. Note that advertising does not feature at all in Table 3; within these model results advertising spend does not play a role as a driver or as a response variable in the echoverse.

However, some firm strategies pay off, as shown in the row in Table 3 for the impact of firm communications. Both more positive press releases and more positive company tweets lead to more positive online WoM. Firm communications also have an impact on the traditional media: press releases lead to more news articles. And finally, an increase in the volume of company tweets has a marginally significant positive effect on consumer sentiment.

**Business impact**

Figure 3 shows the population-level IRFs for the cumulative impact of a shock in the variables from the echoverse on business outcomes, as specified by equation (2). We report the cumulative impact because the focal dependent variable, customer deposits, is modeled in first differences. Figure 3a shows that a one-time shock in consumer sentiment has a positive and lasting effect on customer deposits, a case of "hysteresis" (Dekimpe and Hanssens 1999). Advertising (Figure 3b) and online WoM valence (Figure 3c) do not have significant effects, at least not at the population level and not for the full sample. In the next subsections we refine these conclusions by examining the results by bank and time period.

**Differences over time**

Given the rapid growth in membership and usage of Twitter since its inception in 2006, its role in the echoverse may well have changed over the time period of our study. To explore this, we ran a split-half analysis, where we estimated the model separately for the first half of the data (June 14, 2007 until September 23, 2010, or 172 weeks) and for the second half of the data (September 30, 2010 until January 2, 2014, or 171 weeks). Tables 4a and 4b compare the percentage of significant effects in the echoverse for the two halves of the data. One key conclusion is that the echoverse has generally intensified over time: 10 out of 16 cells have a higher percentage of significant effects; five cells remain the same and one cell decreases. In particular, we conclude

- Traditional media has become more responsive to online WoM (from 50% to 100%) and to consumer sentiment (from 50% to 100%) but less responsive to firm communications (from 30% to 10%).
- Online WoM has become more responsive to traditional media news stories (from 50% to 100%).
- Firm communications have become more responsive to online WoM (from 20% to 40%) and to consumer sentiment (from 0% to 40%) but not to traditional media news stories (stays 10%); they have also become more self-reinforcing (from 32% to 40%).
- Consumer sentiment has become more responsive to traditional media news stories (from 50% to 100%), to online WoM (from 50% to 100%), and to firm communications (from 0% to 40%).

Figure 4 shows IRFs that illustrate the intensifying echoverse. Online WoM valence does not significantly impact the number of news articles in the first half of the data, but in the second half the effect becomes significant and negative. This implies that as online WoM is more negative, more news articles will be written about the bank in question.

Figure 5 reveals that the link between the echoverse on business outcomes has changed substantially. Consumer sentiment was once a strong driver of customer deposits (Figure 5a), but its influence has waned (Figure 5b). In contrast the valence of online WoM was not a significant driver of customer deposits in the first half of the data (Figure 5e), but it began to have an impact in the second half (Figure 5f), albeit with some noise around it. (Since the sample size is halved in these analyses, the estimates can be noisy.) One aspect of the echoverse that has not changed over time is the lack of influence of advertising on consumer deposits (Figure 5c and 5d).

**Company differences: Press releases**

The discussion so far has focused on the IRFs based on the hyperparameters, representing the average result across banks. However, Table 1 shows some salient differences between banks, in particular with respect to their communication activities and the effectiveness of that communication. For example, Wells Fargo is particularly active and effective in its press releases. To illustrate this, Figure 6 illustrates how Wells Fargo (Figure 6a) is more responsive in its press release activities to news stories than Bank of America (Figure 6b). This responsiveness pays off in terms of driving the valence of public tweets through press releases, which is (just)

significant for Wells Fargo (Figure 6c) but clearly insignificant for Bank of America (Figure 6d). Unlike Bank of America, Wells Fargo's press releases are instrumental in driving the volume of news articles (Table 3).

To understand this pattern of results for Wells Fargo's press release activity relative to Bank of America, we conducted a follow-up linguistic analysis of the press releases issued by the two firms. The spider graphs in Figure 7 illustrate the different word categories that emerged as prominent in the press releases issued by each bank across our study's time frame. Since LIWC uses a dictionary of terms that are defined for different types of words, such as positive and negative emotional words, money-related words, and anger words, and outputs 80 different measurements of the underlying text in the body of press releases; we then used these measurements to generate Figure 7. As shown in Figure 7, prominent (compared to the other banks) term categories that are identified in Wells Fargo's press releases include *work, money, tentative,* and *certainty*. For Bank of America, press releases exhibit terms pertaining to *anxiety*, *negative emotion*, *money*, and *anger*. Thus, these firms' unique approaches to writing press releases subsequently impact the firms' performance.

To understand these results, we consulted the financial service industry experts' interviews. Paul, the bank marketing executive, provided some insight into differences between corporate communications strategies for Bank of America and Wells Fargo over the last decade. During much of the time period Bank of America was

> "responding to the fact that they foreclosed on a parrot. Or had a branch manager who took U.S. flags off of the bank property. Or those kinds of crazy things that happen, where Wells Fargo doesn't have to deal with that, they're not having to be reactive, they can be more proactive, they can pick and choose what they want to talk about. Bank of America didn't have a choice in some cases. They had to respond to things that happened. Chase had some of the same freedom that Wells had, they weren't being pulled down into this foreclosure crisis thing that they had to deal with, or the fee crisis. Neither bank [Wells Fargo or Chase] created a fee crisis for themselves. So, they were able to pick and choose what they wanted to talk about."

Amy, the competitive intelligence expert, echoed this notion that Bank of America was forced to respond to greater negativity in the media, commenting, "I just think people are slower to forgive them [Bank of America]. They're in the press all the time and in a negative way and in the headlines." She noted that "Wells sort of skated a lot freer."

Bank of America's general lack of responsiveness via press releases can also be viewed as consistent with a "go dark" communications strategy, described by numerous interviewees as a common response during challenging periods. Phil, a current bank CMO with decades of industry experience, comments that Bank of America's communications efforts generally lacked effectiveness because of a negative bias in the media during the time period. He states

> "when you had news out like of the robo-signing, which everyone was doing in one way or another, Bank of America just got dinged much stronger than other banks. Yet, when you look at the fines that regulators imposed, they were kind of across the board. So regulators were saying, 'You are all kind of screwing it up the same,' but the poster child in the press was always Bank of America. "

He elaborates that, during that time period "Bank of America could do no right and everything they did was negative and it sort of self perpetuated, for that time." As negatively biased media appeared less likely to be swayed, BofA responded less to negative media coverage. Thus, the lack of responsiveness may reflect a strategic decision to "lay low."

**Company differences: Use of Twitter**

While Wells Fargo's press release strategy is the most effective across the four banks, its Twitter strategy is the least effective. It is the only bank for which the volume of its tweets is not a significant driver of the volume and valence of online WoM (Table 3). It is also the only bank for which more positive online WoM leads to a drop in consumer sentiment. The other banks appear to have much more effective Twitter strategies. Chase and Citi can drive consumer sentiment through the volume of their company tweets, whereas Bank of America is the only bank that is able to drive sentiment through the valence of its tweets (Table 4). Bank of America is also the only bank that responds to more positive news through more positive company tweets.

To explore why Bank of America has a more effective Twitter strategy than Wells Fargo in particular, we conducted a follow-up analysis of their tweets. As shown in Table 1, Bank of America averages significantly more tweets per week (272) than Wells Fargo (52). However, the average valence of Bank of America's tweets (.16) is much lower than Wells Fargo's (.65). Thus, Bank of America's tweets are on average more moderate in tone than Wells Fargo's. Interestingly, the standard deviation in company Twitter valence for Bank of America (.20) is barely half that for Wells Fargo (.42). One could infer that Bank of America has a much higher volume of tweets, which are more consistent (lower standard deviation) and more moderate in tone than Wells Fargo's tweets. This high-volume, consistent, and reasonably toned Twitter

strategy apparently strikes a chord with consumers and enhances consumer sentiment. Wells Fargo's strategy of issuing (too) positive tweets may have a hollow ring to consumers and therefore lack impact or may even backfire.

Evidence for different strategies in Twitter use can be found by examining the distribution of tweets across the different firm-sponsored Twitter accounts. We provide in Table 5 a breakdown of the total number tweets across accounts used primarily for customer service versus accounts related to news, information, and promotion across the four banks. All tweets from each account were also scanned for individual Twitter usernames. We tallied the total number of mentions (tweets containing a username), replies (username appearing at the beginning of a tweet) or retweets (tweets specifically contained any form of the letters RT at the beginning of the tweet). As shown in Table 5, Bank of America focuses more heavily on using Twitter for customer service than the other banks, with over 90% of its tweets originating from customer service accounts versus 60% to 70% for the other firms. In addition, tweets from customer service accounts across all four banks are more likely to be in the form of mentions or replies. Of the four banks, Chase and Citi are more likely than the others to use promotional Twitter accounts in general, and Chase is most likely of the four banks to engage in one-on-one promotional communications via its Twitter accounts (26.55% of its replies are from promotional accounts.).

Differences in the banks' Twitter strategies were also highlighted in a report compiled by Sparkcentral, a customer experience software developer (Vu 2012). The report notes that, as of 2012, Bank of America's customer service responses "are wildly higher than any other bank" and that Bank of America has a policy of answering most of the complaints it receives, whereas the other banks tend to largely ignore complaints and "let people vent." Responding to complaints would arguably lead to less positive tweet valence than using Twitter primarily for promotional purposes. Most importantly, responding to individual customers versus broadcasting messages appears to be the key distinction in the banks' Twitter strategies.

*Link with business outcomes: differences between banks.* There are also differences across banks in the way the echoverse impacts business outcomes. For three out of four banks, consumer sentiment has a positive and significant long-term effect on customer deposits, with IRFs similar to Figure 3a. The exception is Citi, for which this effect is insignificant. This result can be explained by the differences in Citi's customer base and business model. In his interview,

Paul explains that Citi has a greater focus on business customers; therefore, consumer sentiment would not necessarily capture this particular segment. "Citi just has a smaller customer base." Banking expert Amy also notes that Citi "just started shutting things down and they are in a much smaller number of markets."

For Bank of America (significant at 5% one-sided) and Citi (significant at 10% one-sided), advertising has a positive effect on customer deposits. These two firms were also subject to the most negative consumer sentiment during the observation period. Thus, for these two banks, advertising is a way to overcome negative buzz in the echoverse. The caveat is that the effect is only temporary as Figure 8 illustrates for Bank of America: a one-period shock in advertising only affects customer deposits significantly for one first quarter, but the effect becomes insignificant after that. To ensure a continuing impact on customer deposits, Bank of America would need a systematically higher advertising investment.

## Discussion

### Summary of findings

*Research Question 1: Does the echoverse exist?* Based on a study of four leading consumer banks, our findings clearly show that the echoverse exists. Traditional media news stories, online WoM and firm communications all reverberate and echo one another (and themselves). Consistent with our modeling results, the notion that each component of the echoverse can "grab the microphone" and influence each other was described throughout our discussions with managers. Carl, the PR consultant comments on this interplay between traditional media mews stories and social media WoM by stating "You see news outlets reporting what's going on in social media and you hear social media links on what's happening in traditional media. Where it starts to get more challenging to deal with is when they start feeding off each other."

*Research Question 2: Is the echoverse changing over time?* Our findings show that the echoverse is intensifying, with the number of echoes and reverberations increasing as online WoM proliferates. We find that online WoM has a greater impact over time, and traditional consumer sentiment measures have less impact on performance. This finding confirms the increasing centrality of online WoM in driving business outcomes. During the time period of our

study, the use of social media by both consumers and marketers increased dramatically. Twitter use grew from approximately 5,000 tweets per day in 2007 to more than 300,000 per day in 2008, to over 500 million tweets per day in 2013 (http://www.internetlivestats.com/twitter-statistics/#trend). This growth was reflected heavily in the interviews where a central theme emerged: social media enable a greater voice among all components of the echoverse. As George incisively describes:

> "The big change is social media. The ability to communicate much more quickly. The ability to, if you want, to target communications between an organization and the stakeholders. And then of course, the ability of stakeholders to communicate among themselves. . . . There is just a relentless push outwards I'll say of using [these] communications channels to communicate with people."

*Research Question 3: Are some companies managing the echoverse better than others?* Our findings show different levels of effectiveness in managing the echoverse across companies. Wells Fargo has the most effective press release strategy, in terms of driving news stories, but has the least effective Twitter strategy. Bank of America, on the other hand, has an effective Twitter strategy, in terms of driving consumer sentiment, but is less effective in its corporate communications strategy. Our narratives highlight differences in the strategies employed by these two companies. First, as noted above, Wells Fargo tends to use Twitter as a positive "broadcast" medium, rather than responding to individual customers. This may not resonate with consumers. Bank of America tends to use Twitter as a vehicle for personalized responses to customers, matching this much higher volume of Twitter use with a more moderate tone in terms of content. Our industry experts observe that Bank of America was leveraging Twitter much earlier than the other banks in our study for customer service purposes, which perhaps suggests that consumers react more positively to personalized tweets that are focused on responding to the customer, rather than "broadcast" tweets that are mostly focused on the bank.

Next, Bank of America's approach to press releases during the time period of our study is consistent with a "go dark" strategy that is characterized by potentially ineffective content. Our results suggest the firm may have been better off being more responsive via press releases; however, adjustments in content to reduce the tendency to directly reflect the negativity in the press would have been critical. Lastly, Bank of America and Citi are found to have a positive,

but short-lived, result from their advertising spend. This finding suggests that larger and more sustained investment in broadcast communications such as advertising is required to see a return.

**Theoretical contributions**

This study expands on the echo chamber idea that is widely postulated in the popular business press. It builds the conceptual framework of a reverberating echoverse, in which all brand communications vehicles echo all others (and themselves). Consumer sentiment and business outcomes are theorized to link to the brand communications vehicles in the echoverse. Whereas previous research tends to focus on isolated aspects of the echoverse (e.g., online WoM, press releases, advertising, corporate Twitter posts, and traditional media news stories), our framework considers all of these sources in one model and then theorizes and measures their feedback loops.

Our results contribute to existing theoretical perspectives on the reverberation of messages among components of the brand communication environment. Our findings expand on the notion of the megaphone (McQuarrie et al. 2013) to illustrate how each component of the echoverse can grab the attention of an audience. McQuarrie et al. (2013) suggest that social capital can be built more effectively by repeated and responsive messages in social media as in the case of Bank of America's Twitter strategy, and also in traditional media such as corporate communications in the case of Wells Fargo's press release strategy.

**Managerial contributions**

This study offers insights about how marketing managers can have a greater impact on consumer sentiment, and ultimately on firm performance. Some of the most important are

1. Confirming popular perception, online WoM is growing increasingly important as traditional measures of consumer sentiment become less important. This shows that online WoM marketing strategies are central to driving business outcomes.
2. In the consumer-media dyad, *negative* news has stronger reverberations, whereas in the consumer-consumer-dyads, *positive* news has stronger reverberations. Companies that are able to positively drive consumer sentiment will create opportunities for a virtuous self-enhancing cycle in consumer sentiment.

3. A personalized Twitter strategy, focused on responding to individual customers, may be more effective than a "broadcast" Twitter strategy that is essentially using social media as a promotional medium.
4. A press release strategy that is responsive to traditional media news stories can be effective to the extent it does not directly reflect negativity in the media.
5. Since advertising shows only short-term impact on business outcomes, a larger, sustained investment in advertising may be needed for a lasting performance effect. Over-reliance on advertising may be misplaced, as other communication elements (e.g., online WoM) appear to have a larger impact.
6. Traditional consumer sentiment measures may be growing less predictive of business outcomes, as online WoM becomes more influential.
7. Results also may suggest that a consistent, moderately-toned corporate Twitter strategy can be more effective than a more inconsistent, strongly-toned (positive) strategy, but this implication should be considered tentative, because given our data we cannot disentangle this contrast from the probably more important distinction between a personalized vs. broadcast strategy, as discussed in point 3 above.

Our findings suggest that a brand communications strategy should consider the whole echoverse to include both online and traditional offline elements. Online WoM is gaining importance over time, so relatively more emphasis should be given to online communications as social media continue to expand.

**Limitations and directions for future research**

Despite the expansiveness of this study, it has some limitations in its scope and granularity as well as the rapidly evolving WoM context. This study quantitatively investigated only one industry—financial services. Future research could add to our knowledge by studying whether our results hold in other industries. Moreover, it only utilized one online WoM channel, future research could expand the components of the echoverse by including additional WoM channels (Schweidel and Moe 2014). Additionally, our analysis relied on fairly broad measures such as volume and valence. Future research might address the more granular aspects of brand communications, by breaking brand communications down into specific topics and dimensions, similar to the way in which we began to examine the use of different types of word categories in

the press releases. Future research might also analyze business results on a weekly or monthly level rather than a quarterly one. For the time frame of this study, Twitter data are available at a very granular level, but business outcome data are not. If business outcome data were available at a monthly, or weekly level, or if additional data beyond the end of this study were collected, then the noisiness in these estimates could be reduced. Finally, vehicles for online WoM (e.g., Twitter) are still very young and the online WoM environment is evolving rapidly. Our study already identified changes in the echoverse over seven years. As the echoverse continues to transform itself, new insights and conclusions can be drawn. This has the promise of informing not only magnitude of firm channel use, but also the more specific content of those communications.

**Conclusions**

We conclude that a reverberating echoverse exists. That is, traditional media news stories, online WoM and firm communications all echo one another. This echoverse is intensifying as online WoM assumes greater importance. Thus organizations must manage the echoverse to get the desired business outcomes, and that increasingly implies effectively managing online WoM (both from the public and from the company). Traditional consumer sentiment measures and traditional communications such as advertising may be declining in importance as online WoM becomes more important. As consumer brand communications increasingly move from one-to-one (e.g., conversations) to one-to-many (e.g., social media), corporate communications should shift emphasis from one-to-many (e.g., advertising) to one-to-one (e.g., personalized Twitter messages), making online marketing increasingly the centerpiece of brand communications.

Appendix 1: Qualitative Interview Participants

| Participant | Industry | Role |
|---|---|---|
| Amy | Financial services | Secondary research expert |
| Charles | PR consulting | Senior account executive |
| Carl | PR consulting | CEO |
| George | PR metrics consulting | CEO |
| Greg | Entertainment | Senior marketing executive |
| Henry | Pet products | Senior brand manager |
| Nigel Hollis* | Brand and Communications Research (Millward Brown, division of Kantar) | Brand expert and author of: *Brand Premium: How Smart Brands Make More Money* |
| Howard | Retail | Senior PR executive |
| Mary | Advertising | Senior account executive |
| Paul | Financial services | Senior marketing executive |
| Phil | Financial services | CMO |
| Sam | Entertainment | Senior digital media manager |
| Steve Barrett* | Publishing | Editor of *PR Week Magazine* |

* Two participants permitted us to use their names. The others are pseudonyms.

Appendix 2: News Publications

| | |
|---|---|
| Atlanta Journal and Constitution | New York Times |
| Boston Globe | Orange County Register |
| Denver Post | Philadelphia Inquirer |
| Las Vegas Review | Tampa Bay Times |
| Minneapolis Star Tribune | USA Today |
| New York Daily News | Wall Street Journal |
| New York Post | Washington Post |

REFERENCES


Ahluwalia, Rohini, Robert E. Burnkrant, and H. Rao Unnava (2000), "Consumer Response to Negative Publicity: The Moderating Role of Commitment," *Journal of Marketing Research*, 37, 203-14.

An, Seon-Kyoung (2011), "Reducing Anger and Blame: The Role of the Morality News Frame and Crisis Response Strategy," *Public Relations Review*, 37 (2), 169-71.

An, Seon-Kyoung, Karla K. Gower, and Seung Ho Cho (2011), "Level of Crisis Responsibility and Crisis Response Strategies of the Media," *Journal of Communication Management*, 15 (1), 70-83.

Berger, Jonah and Raghuram Iyengar (2013), "Communication Channels and Word of Mouth: How the Medium Shapes the Message," *Journal of Consumer Research*, 40 (3), 567-79.

Berger, Jonah and Katherine L. Milkman (2012), "What Makes Online Content Viral??," *Journal of Marketing Research*, 49 (2), 192-205.

BernsteinResearch (2014), "U.S. Banks: Who'll get Fatter When Deposits Matter?," in Black Book, Bernstein Research (Ed.). New York, N.Y.: Bernstein Research.

Chen, Yubo, Shankar Ganesan, and Yong Liu (2009), "Does a Firm's Product-Recall Strategy Affect Its Financial Value? An Examination of Strategic Alternatives During Product-Harm Crises," *Journal of Marketing*, 73, 214-26.

Chevalier, Judith A. and Dina Mayzlin (2006), "The Effect of Word of Mouth on Sales: Online Book Reviews," *Journal of Marketing Research*, 43 (3), 345-54.

Chib, Siddhartha and Edward Greenberg (1995), "Hierarchical analysis of SUR models with extensions to correlated serial errors and time-varying parameter models," *Journal of Econometrics*, 68 (2), 339-60.

Choi, Jinbong (2012), "A Content Analysis of BP's Press Releases Dealing with Crisis," *Public Relations Review*, 38 (3), 422-29.

Cleeren, Kathleen, Harald J. van Heerde, and Marnik G. Dekimpe (2013), "Rising from the Ashes: How Brands and Categories Can Overcome Product-Harm Crises," *Journal of Marketing*, 77, 58-77.

Coombs, W. Timothy and Sherry J. Holladay (2008), "Comparing Apology to Equivalent Crisis Response Strategies: Clarifying Apology's Role and Value in Crisis Communication," *Public Relations Review*, 34 (3), 252-57.

---- (2014), "How Publics React to Crisis Communication Efforts," *Journal of Communication Management*, 18 (1), 40-57.

Corbin, Juliet and Anselm Strauss (1990), "Grounded Theory Research: Procedures, Canons, and Evaluative Criteria," *Qualitative Sociology*, 13 (1), 3.

Corstjens, Marcel and Andris Umblijs (2012), "The Power of Evil: The Damage of Negative Social Media Strongly Outweigh Positive Contributions," *Journal of Advertising Research*, 52 (4), 433-49.

Dawar, Niraj and Madan M. Pillutla (2000), "Impact of Product-Harm Crises on Brand Equity: The Moderating Role of Consumer Expectations," *Journal of Marketing Research*, 37, 215-26.

Dekimpe, Marnik G. and Dominique M. Hanssens (1995), "Empirical Generalizations about Market Evolution and Stationarity," *Marketing Science*, 14 (3), G109.

---- (1999), "Sustained Spending and Persistent Response: A New Look at Long-Term Marketing Profitability," *Journal of Marketing Research*, 36 (4), 397-412.

Gaullagher, John and Sam Ransbotham (2010), "Social Media and Customer Dialog Management at Starbucks," *MIS Quarterly Executive*, 9, 197-212.

Go, A., L. Huang, and R. Bhayani (2009), "Twitter Sentiment Analysis," *Entropy*, June, 1.

Godes, David and Dina Mayzlin (2009), "Firm-Created Word-of-Mouth Communication: Evidence from a Field Test," *Marketing Science*, 28 (4), 721-39.

---- (2004), "Using Online Conversations to Study Word-of-Mouth Communication," *Marketing Science*, 23 (4), 545-60.

Goldenberg, Jacob, Gal Oestreicher-Singer, and Shachar Reichman (2012), "The Quest for Content: How User-Generated Links Can Facilitate Online Exploration," *Journal of Marketing Research*, 49 (4), 452-68.

Hamilton, Ryan, Kathleen D. Vohs, and Ann L. McGill (2014), "We'll Be Honest, This Won't Be the Best Article You'll Ever Read: The Use of Dispreferred Markers in Word-of-Mouth Communication," *Journal of Consumer Research*, 41 (1), 197-212.

Klein, Jill and Niraj Dawar (2004), "Corporate Social Responsibility and Consumers' Attributions and Brand Evaluations in a Product–Harm Crisis," *International Journal of Research in Marketing*, 21 (3), 203-17.

Kumar, V., Vikram Bhaskaran, Rohan Mirchandani, and Milap Shah (2013), "Creating a Measurable Social Media Marketing Strategy: Increasing the Value and ROI of Intangibles and Tangibles for Hokey Pokey," *Marketing Science*, 32 (2), 194-212.

Kwak, H. , C. Lee, and S. Moon (2010), "What is Twitter, a Social Network or a News Media?," in The 19th International Conference on World Wide Web AMS.

Lei, Jing, Niraj Dawar, and Zeynep Gurhan-Canli (2012), "Base-Rate Information in Consumer Attributions of Product-Harm Crises," *Journal of Marketing Research*, 49, 336-48.

McQuarrie, Edward F., Jessica Miller, and Barbara J. Phillips (2013), "The Megaphone Effect: Taste and Audience in Fashion Blogging," *Journal of Consumer Research*, 40 (1), 136-58.

Moe, Wendy W. and David A. Schweidel (2012), "Online Product Opinions: Incidence, Evaluation, and Evolution," *Marketing Science*, 31 (3), 372-86.

Naylor, Rebecca Walker, Cait Poynor Lamberton, and Patricia M. West (2012), "Beyond the "Like" Button: The Impact of Mere Virtual Presence on Brand Evaluations and Purchase Intentions in Social Media Settings," *Journal of Marketing*, 76 (6), 105-20.

Pennebaker, James W. and Martha E. Francis (1996), "Cognitive, Emotional, and Language Processes in Disclosure," *Cognition & Emotion* 10 (6), 26.

Perkins, Andrew W. and Mark R. Forehand (2012), "Implicit Self-Referencing: The Effect of Nonvolitional Self-Association on Brand and Product Attitude," *Journal of Consumer Research*, 39 (1), 142-56.

Pesaran, H. Hashem and Yongcheol Shin (1998), "Generalized Impulse Response Analysis in Linear Multivariate Models," *Economics Letters*, 58 (1), 17-29.

Pullig, Chris, Richard G. Netemeyer, and Abhijit Biswas (2006), "Attitude Basis, Certainty, and Challenge Alignment: A Case of Negative Brand Publicity," *Journal of the Academy of Marketing Science*, 34 (4), 528-42.

Schweidel, David A. and Wendy W. Moe (2014), "Listening In on Social Media: A Joint Model of Sentiment and Venue Format Choice," *Journal of Marketing Research*, 51 (4), 387-402.

Spiggle, Susan (1994), "Analysis and Interpretation of Qualitative Data in Consumer Research," *Journal of Consumer Research*, 21 (December), 491-503.

Steenkamp, Jan-Benedict E. M. and Eric Fang (2011), "The Impact of Economic Contractions on the Effectiveness of R&D and Advertising: Evidence from U.S. Companies Spanning Three Decades," *Marketing Science*, 30 (4), 628-45.

Stephen, Andrew T. and Jeff Galak (2012), "The Effects of Traditional and Social Earned Media on Sales: A Study of a Microlending Marketplace," *Journal of Marketing Research*, 49 (5), 624-39.

Stephen, Andrew T. and Olivier Toubia (2010), "Deriving Value from Social Commerce Networks," *Journal of Marketing Research (JMR)*, 47 (2), 215-28.

Thompson, Craig J., Howard R. Pollio, and William B. Locander (1994), "The Spoken and the Unspoken: A Hermeneutic Approach to Understanding the Cultural Viewpoints That Underlie Consumers' Expressed Meanings," *Journal of Consumer Research*, 21 (December), 432-52.

Tirunillai, Seshadri and Gerard J. Tellis (2012), "Does Chatter Really Matter? Dynamics of User-Generated Content and Stock Performance," *Marketing Science*, 31 (2), 198-215.

Toubia, Olivier and Andrew T. Stephen (2013), "Intrinsic vs. Image-Related Utility in Social Media: Why Do People Contribute Content to Twitter?," *Marketing Science*, 32 (3), 368-92.

Trusov, Michael, Randolph E. Bucklin, and Koen Pauwels (2010), "Monetary Value of Word-of-Mouth Marketing in Online Communities," *GfK-Marketing Intelligence Review*, 2 (1), 26-33.

van Heerde, Harald, Kristiaan Helsen, and Marnik G. Dekimpe (2007), "The Impact of a Product-Harm Crisis on Marketing Effectiveness," *Marketing Science*, 26 (2), 230-45.

Vu, Sophie (2012), "Cashing in on Social Customer Service? Top 4 US Banks Compared!," [available at http://www.sparkcentral.com/cashing-in-on-social-customer-service-top-4-us-banks-compared/%5D.

Wang, Fang, Xiao-Ping Zhang, and Ming Ouyang (2009), "Does Advertising Create Sustained Firm Value? The Capitalization of Brand Intangible," *Journal of the Academy of Marketing Science*, 37 (2), 130-43.

Zhao, Yi, Ying Zhao, and Kristiaan Helsen (2011), "Consumer Learning in a Turbulent Market Environment: Modeling Consumer Choice Dynamics After a Product-Harm Crisis," *Journal of Marketing Research*, 48, 255-67.

Figure 1: Brand Communications Literature (Representative Studies)

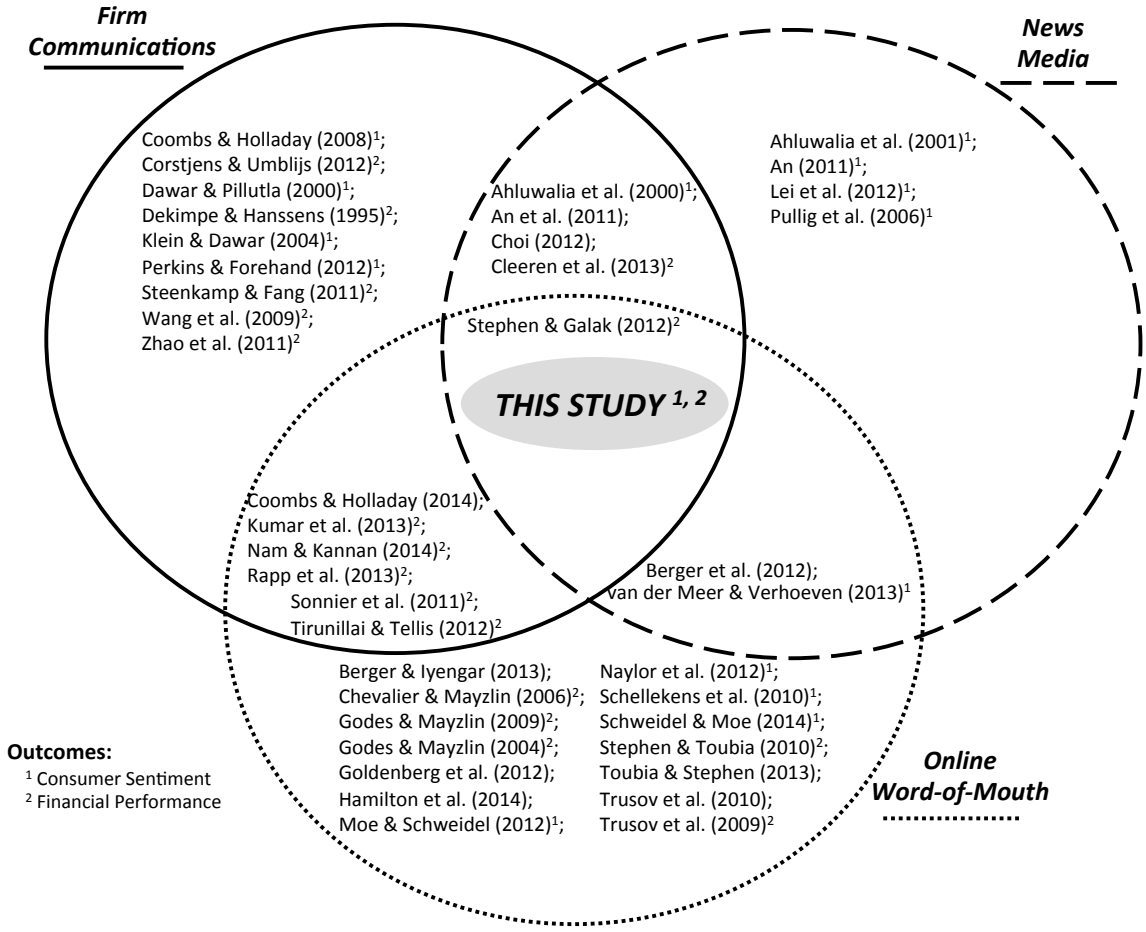


Figure 2: The Echoverse

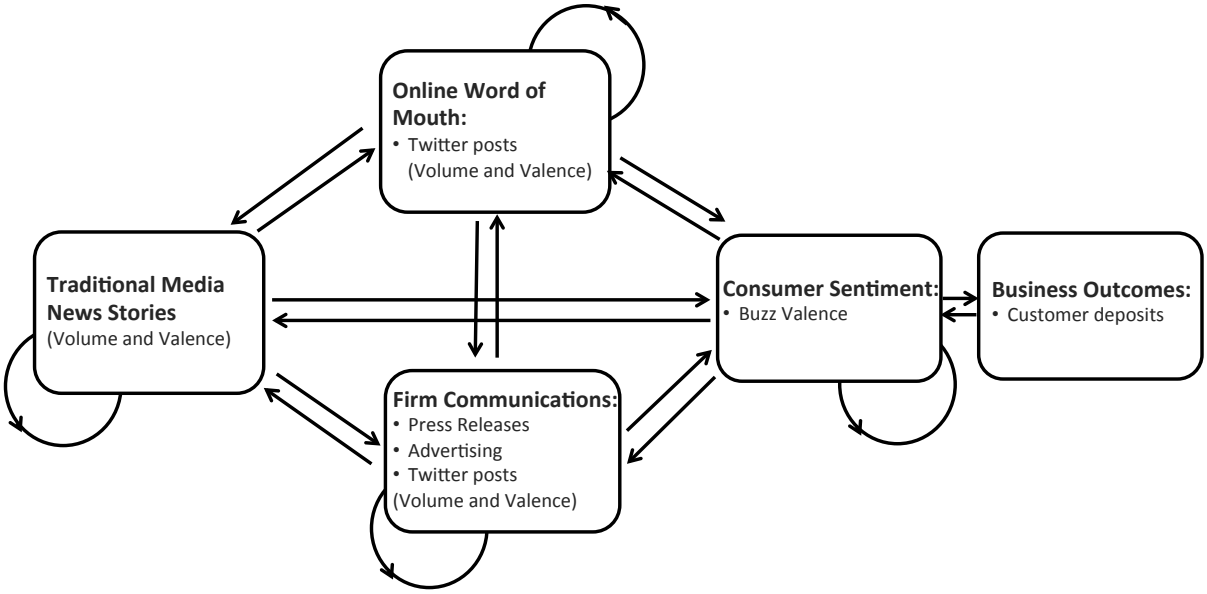
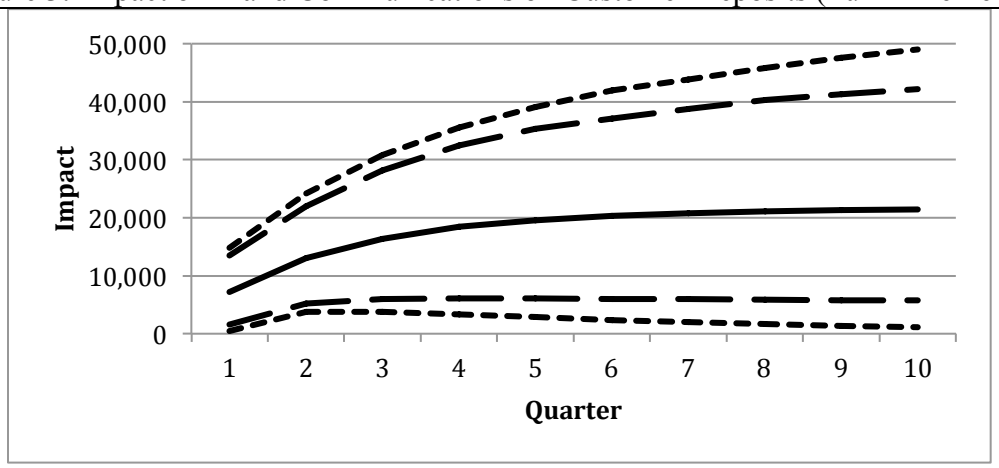
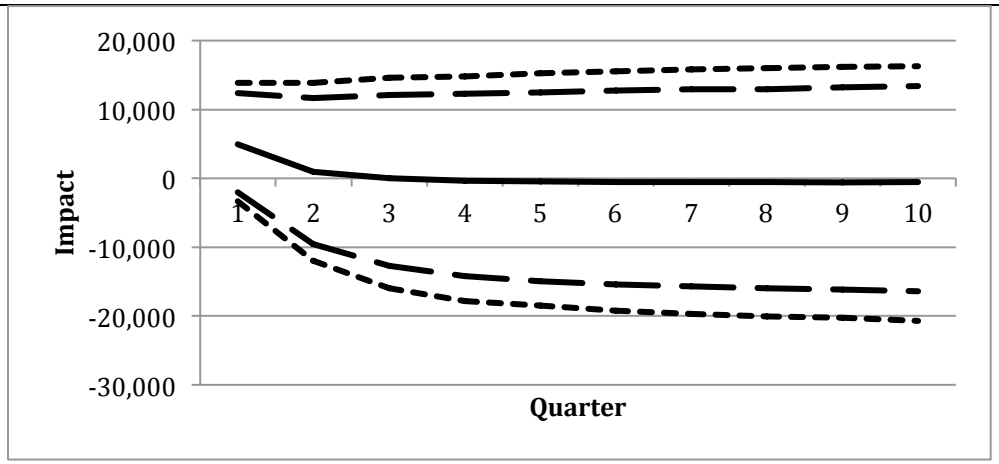


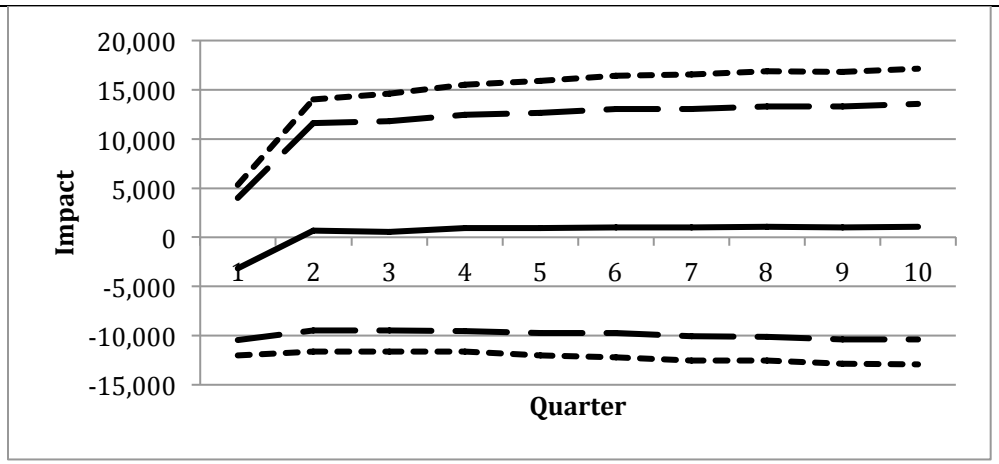
Figure 3: Impact of Brand Communications on Customer Deposits (Full Time Period)




3a: Consumer Sentiment Positively Impacts Customer Deposits



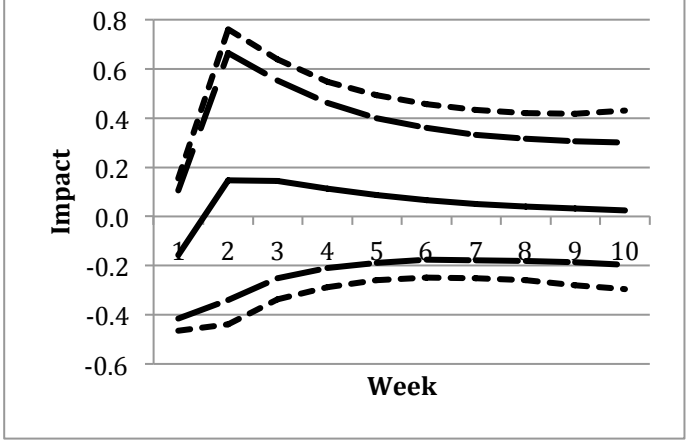

3b: No Effect of Advertising on Customer Deposits



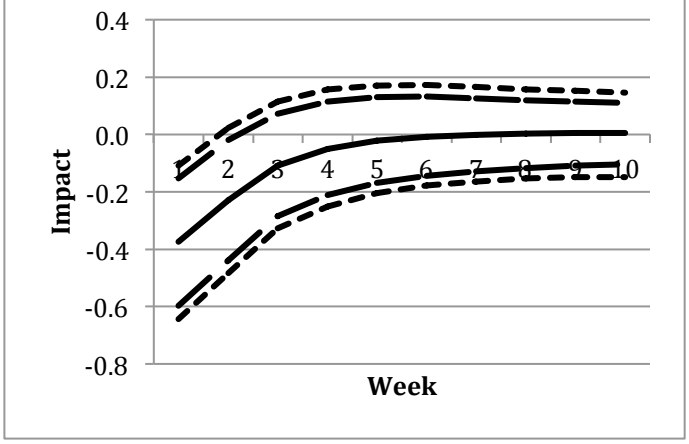

3c: No Effect of Online WoM on # Customer Deposits

The solid black line is the median effect. The long (short) dashes show 95% (90%) posterior densities.

Figure 4: Impact of Online WoM Valence on the Volume of News Articles (Early vs. Later)



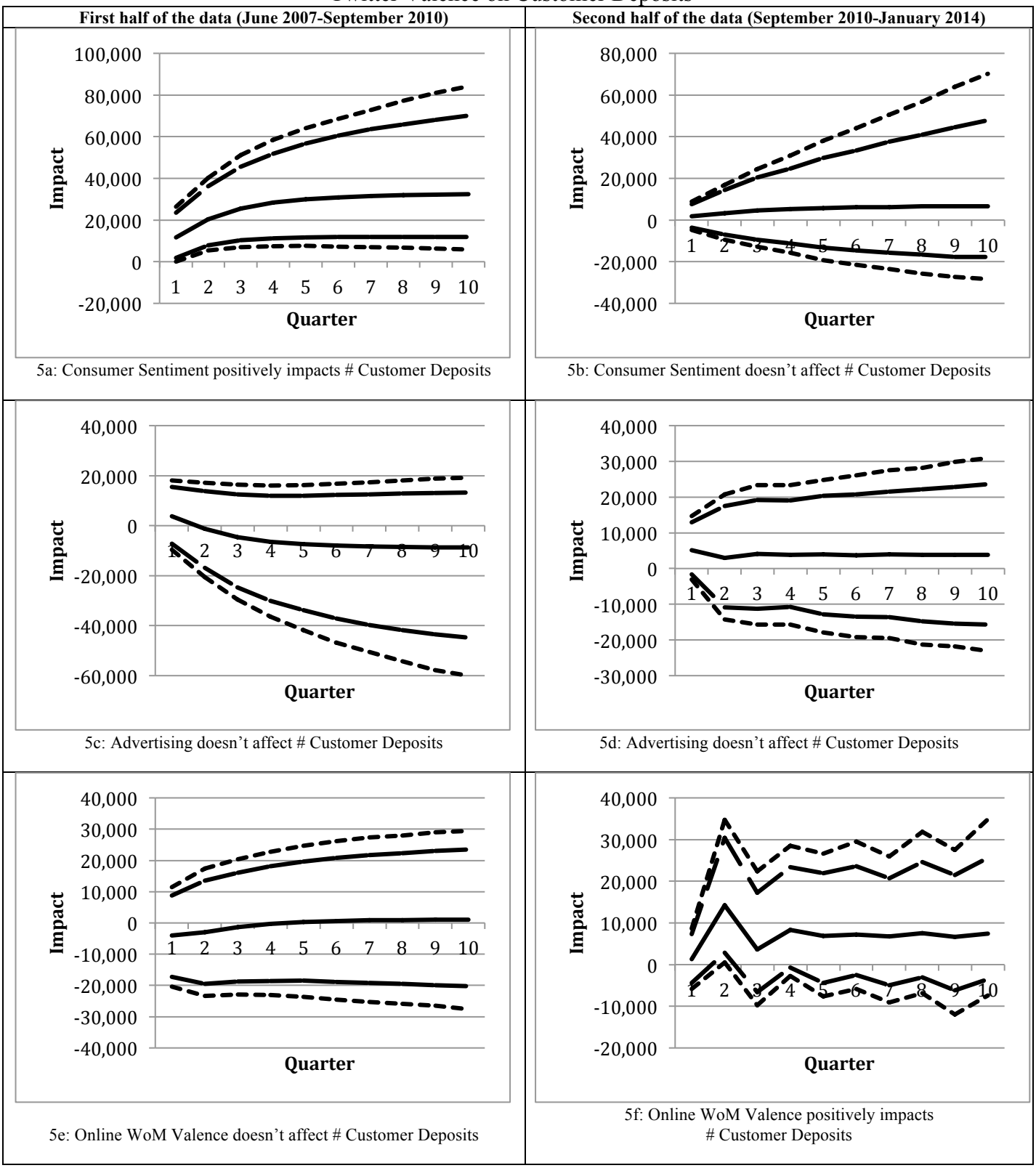

4a. (June '07-Sept. '10) Online WoM Valence has no effect on Volume of News Articles




4b. (Sept. '10-Jan. '14) More negative Online WoM leads to higher Volume of News Articles

The solid black line is the median effect. The long (short) dashes show 95% (90%) posterior densities.

Figure 5: Change over Time in the Impact of Consumer Sentiment, Advertising and Public Twitter Valence on Customer Deposits




5a: Consumer Sentiment positively impacts # Customer Deposits

5b: Consumer Sentiment doesn't affect # Customer Deposits

5c: Advertising doesn't affect # Customer Deposits

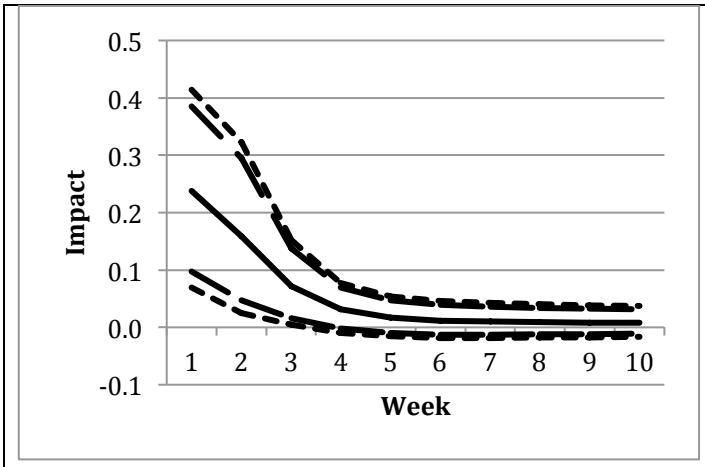
5d: Advertising doesn't affect # Customer Deposits

5e: Online WoM Valence doesn't affect # Customer Deposits

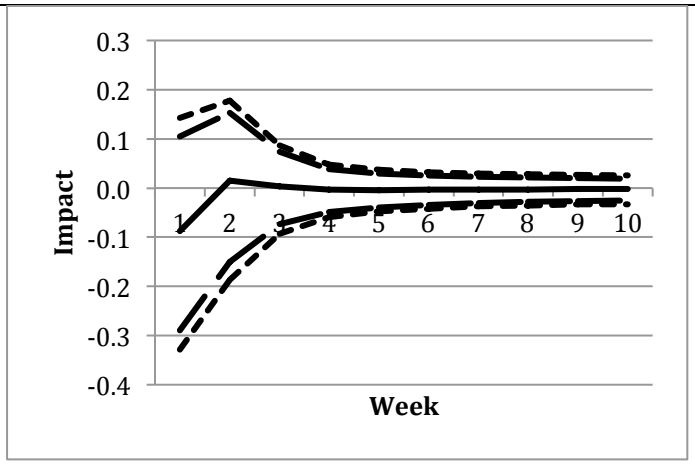
5f: Online WoM Valence positively impacts # Customer Deposits

The solid black line is the median effect. The long (short) dashes show 95% (90%) posterior densities.

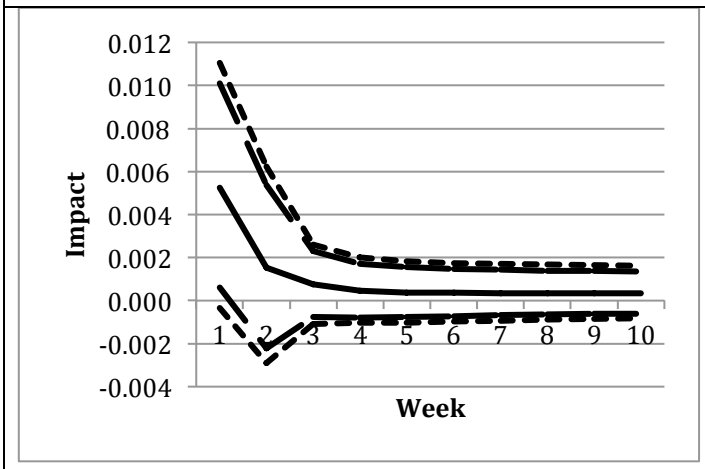
Figure 6: Differential Impacts for Wells Fargo and Bank of America



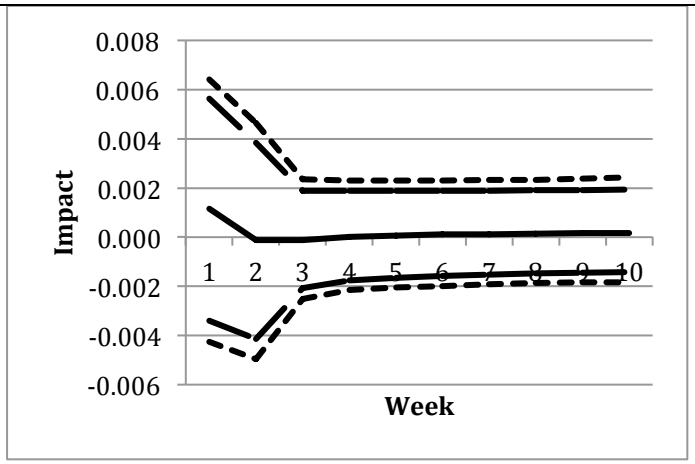

6a: News Article Volume positively impacts Wells Fargo's Volume of Press Releases




6b: News Article Volume doesn't affect Bank of America's Volume of Press Releases



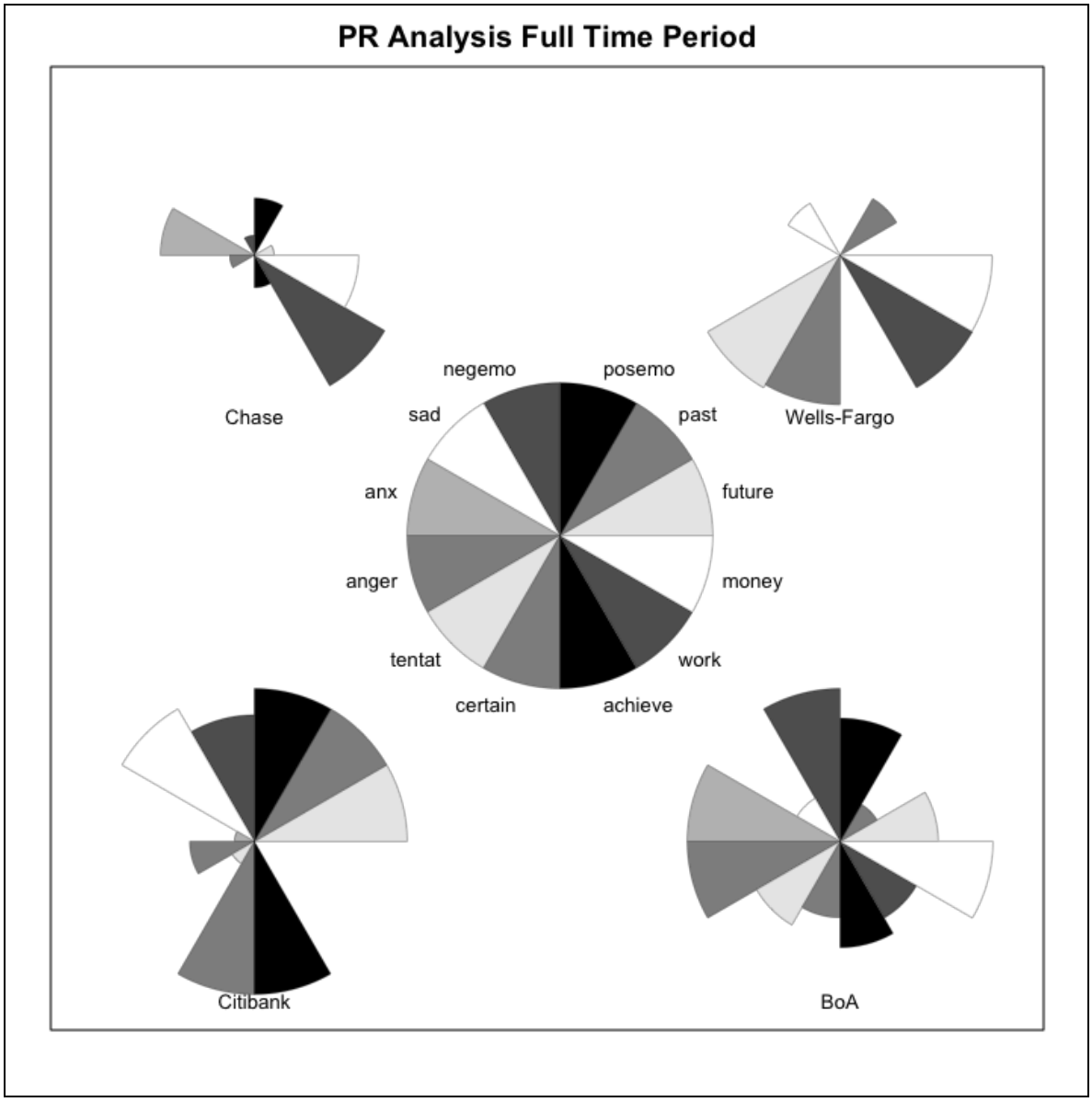

6c. Valence of Wells Fargo's Press Releases positively impacts Online WoM Valence




6d. Valence of Bank of America's Press Releases doesn't affect Online WoM Valence

The solid black line is the median effect. The long (short) dashes show 95% (90%) posterior densities.

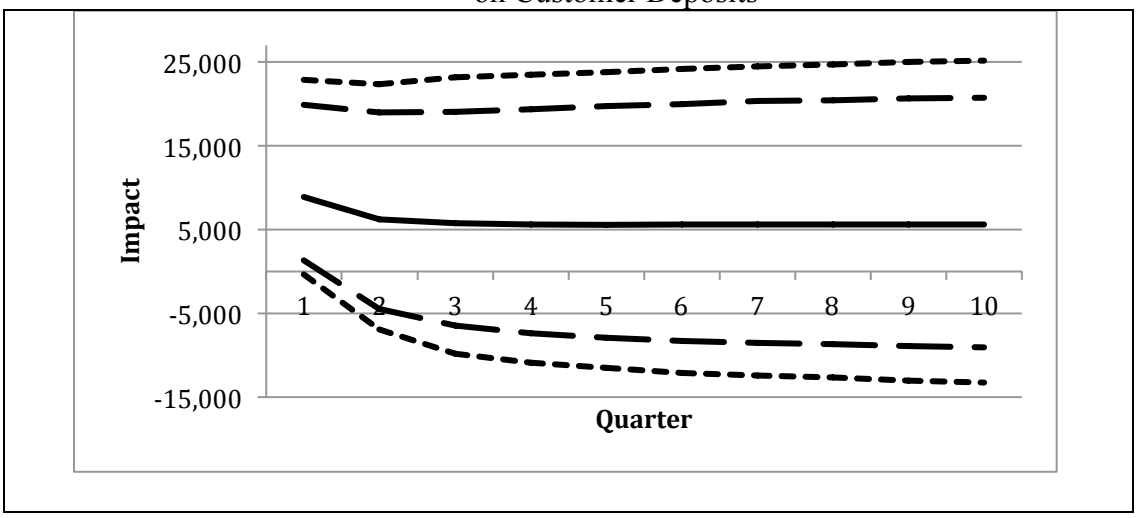
Figure 7: Content Analysis of Press Releases for Focal Banks




**Key:**

| | |
|---|---|
| Achieve = Achieve | Negemo = Negative Emotion |
| Ang = Anger | Past = Past |
| Anx = Anxiety | Posemo = Positive Emotion |
| Certain = Certain | Sad= Sad |
| Future = Future | Tentat = Tentative |
| Money = Money | Work = Work |

Figure 8: Bank of America Advertising has only a temporary impact on Customer Deposits




The solid black line is the median effect. The long (short) dashes show 95% (90%) posterior densities.

Table 1: Variable Operationalizations and Descriptive Statistics

| | | | *Mean (Standard Deviation)* | | | |
|---|---|---|---|---|---|---|
| *Variable* | *Operationalization* | *Source* | *Bank of America* | *Chase* | *Citi* | *Wells Fargo* |
| News Article Volume | Number of news articles per week about each bank in 14 leading newspapers | Factiva | 11.80 (8.50) | 10.24 (6.27) | 11.84 (6.97) | 5.34 (4.61) |
| News Article Valence | Valence of news articles per week about each bank in 14 leading newspapers, weighted by circulation numbers. Valence is measured as the difference between positive valence and negative valence. | Factiva | 0.64 (0.31) | 0.50 (0.32) | 0.59 (0.31) | 0.56 (0.35) |
| Consumer Sentiment | Net percentage of weekly sample of consumers who have heard anything positive or negative about the brand in the media or through word of mouth. The scale runs from +100 (100% positive to -100 (100% negative). | YouGov's BrandIndex | -16.43 (12.67) | -1.61 (6.06) | -13.02 (11.36) | 0.16 (5.73) |
| Online WoM Volume | Number of tweets per week about each bank by the public (i.e., not by the bank itself) | Twitter | 10,723 (10,208) | 11,754 (14,225) | 12,879 (12,272) | 6,199 (5,754) |
| Online WoM Valence | Valence of tweets per week about each bank (i.e., not by the bank itself). Valence is measured as the difference between positive valence and negative valence. | Twitter | 0.58 (0.06) | 0.68 (0.06) | 0.71 (0.08) | 0.64 (0.06) |
| Company Twitter Volume | Number of tweets per week by the bank itself | Twitter | 272.1 (312.1) | 14.04 (27.31) | 25.18 (26.11) | 51.74 (100.3) |
| Company Twitter Valence | Valence of tweets per week by the bank itself. Valence is measured as the difference between positive valence and negative valence. | Twitter | 0.16 (0.20) | 0.25 (0.38) | 0.51 (0.39) | 0.65 (0.42) |
| Press Release Volume | Number of press releases per week for each bank | Bank websites (archives) | 4.34 (2.62) | 3.41 (2.19) | 3.63 (2.40) | 2.61 (1.82) |
| Press Release Valence | Number of press releases per week for each bank. Valence is measured as the difference between positive valence and negative valence. | Bank websites (archives) | 3.13 (1.24) | 2.63 (1.38) | 3.18 (1.45) | 2.24 (1.35) |
| Advertising Spend | Advertising expenditures (in $1000) across all media per week for each bank | Ad$pender | 5,881.9 (2,654.0) | 2,714.8 (1,188.2) | 4,008.1 (2,644.2) | 1,991.7 (1,251.5) |
| Business Outcomes | Level of deposits held by customers at each bank | Bloomberg | 986,534 (112,125) | 1,007,721 (1,007,721) | 866,099 (62,271) | 799,831 (238,351) |

All data are weekly (N = 343 weeks), except for Customer Deposits, which is quarterly (N = 27).

Table 2: Evidence for the Echoverse
(Percentage of IRFs with Significant Effects)

| | ***Response by*** | | | |
|---|---|---|---|---|
| ***Shock in*** | **Traditional media news stories** | **Online WoM** | **Firm Communi-cations** | **Consumer Sentiment** |
| **Traditional media stories** (News Article Volume; New Article Valence) | 50% | 75% | 10% | 50% |
| **Online WoM** (Public Twitter Volume; Public Twitter Valence) | 75% | 100% | 60% | 50% |
| **Firm Communications** (Company Twitter Volume; Company Twitter Valence; Press Release Volume; Press Release Valence; Advertising Spend) | 10% | 60% | 36% | 20% |
| **Consumer Sentiment** | 50% | 0% | 0% | 100% |