Celebrity Endorsements, Firm Value and Reputation Risk: Evidence from the Tiger Woods Scandal

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Abstract

We estimate the stock market effects of the Tiger Woods scandal on his sponsors and sponsors' competitors. In the 10-15 trading days after the onset of the scandal the full portfolio of sponsors lost more than two percent of market value, with losses concentrated among the core three sponsors EA, Nike and PepsiCo (Gatorade). Sponsors' day-by-day losses correlate strongly with Google search intensity regarding the endorsement-related impact of the scandal, as well as with qualitative indicators of "endorsement-related news." At least some sponsors' losses were competitors' gains, suggesting that endorsement deals are partially a business-stealing strategy. However, competitors who were themselves celebrity endorsement-intensive fared relatively worse than those who were not endorsement-intensive, and that difference also correlates day-by-day with news/search intensity regarding the scandal. It appears that the scandal sent a negative market-wide signal about the reputation risk associated with celebrity endorsements.

Keywords: celebrity endorsers, event studies, reputation risk

1 Introduction

As of mid-2009 professional golfer Eldrick 'Tiger' Woods earned roughly $100 million annually in endorsement income, an amount far greater than that earned by any other athlete. On November 27, 2009, Woods was involved in a car accident outside his home. Following the accident, a series of news reports about both the crash and Woods' personal life damaged his public reputation, and several sponsors either stopped featuring him or dropped him outright. In this paper we estimate the stock market effects of the scandal, for both the sponsor firms and their competitors. Some of those competitors are themselves "endorsement-intensive" (but have no deal with Tiger Woods), while others have no celebrity endorsement deals.

Our empirics address several key questions about celebrity endorsements, firm value and business strategy. Does firm value depend materially on investments in celebrity endorsements? If so, do sponsors' gains and losses from celebrity endorsements represent net market value creation/destruction, or business-stealing from other firms? And, does the stock market reflect changing expectations about the "reputation risk" that firms take on by attaching their brands to celebrities? Previous work on celebrity sponsorship almost exclusively focuses on the first question, rather than the latter two. And even the work on gains from sponsorship faces some econometric difficulties that we circumvent, by dint of examining the downside of a scandal rather than the upside of the initial endorsement deal. We also employ novel auxiliary data from Google Insights that allow us to correlate endorsement-related news/search intensity with changes in firm value; to our knowledge, ours is the first paper to use internet search intensity to understand changes in brand value.

Our first empirical finding is that between the car accident and Woods' announcement ten trading days later of an 'indefinite leave' from golf, his sponsors' overall market value declined by over two percentage points. This holds whether we measure losses relative to the stock market overall, or relative to both the overall market and competitor firms in the sponsors' primary industries. Narrower groups of "Primary" firms with the biggest endorsement contracts, or that had made large complementary investments in the "Tiger brand," lost more in percentage terms. The losses grow further by fifteen trading days after the accident.

We sharpen the empirics by showing a strong relationship between daily abnormal returns and several measures of endorsement-related news/search intensity during the scandal. For example, during the scandal sponsors' losses are greater on days when the search term "Tiger Woods en-

dorsement" is more popular on Google, a result that is statistically significant and economically substantive. For Woods' core three "Tiger Brand" sponsors Google search intensity explains over thirty percent of variation in abnormal returns during the fifteen trading days after the onset of the scandal; the figure is lower but still significant for the full set of sponsors. The quantitative search intensity outperforms an author-defined variable denoting significant "endorsement-related news days."

We also estimate stock price changes for sponsors' competitors. We find that as sponsors lost market value, competitors gained market value, as long as those competitors were themselves *not* heavily invested in celebrity endorsements. Sponsors' competitors with at least one celebrity endorsement deal experienced returns that are statistically significantly smaller than those experienced by competitors without any celebrity endorsement deals, and close to zero on net. The day-to-day pattern of competitors' abnormal returns correlates strongly with both sponsors' returns, and with our auxiliary measures of news/search intensity; on days of high search interest in the term "Tiger Woods endorsement," non-endorsement-intensive competitors' gains are more positive, and more positive relative to endorsement-intensive competitors.

In the context of prior work linking stock market value to celebrity endorsements, our first result provides clear evidence that in this case, a celebrity endorsement substantively affected stock market value for sponsor firms. The losses that we measure are the converse of stock increases one would suppose were generated initially through Tiger Woods' endorsement deals. Previous evidence of links between endorsements and stock market value has been mixed, because nearly all of that work faces a harder identification problem: it uses initial endorsement announcements, which are likely to be at least partially anticipated by traders, to estimate gains in firm value.[1] The event we examine was by all accounts a complete surprise to the market, making it a near-ideal natural experiment from an event study perspective.

A corollary of our result is that endorsement deals carry substantial risk. While we cannot compare the losses sustained by sponsors to their initial gains, the losses we estimate are large. That suggests taking a view of celebrity endorsement as a risky investment rather than a simple short-run cost-benefit tradeoff—particularly if a firm plans to complement the endorsement deal with co-investment in a new product or brand, as Nike did with its golf line, and as Electronic Arts and Gatorade did with their "Tiger-specific" products.

Our finding that sponsors' losses are competitors' gains is fairly novel in the context of previous

[1] Louie, Kulik, and Jacobson (2001) is a notable exception. We discuss that work below.

work correlating endorsements with firm value. We are aware of one previous study (Mathur, Mathur, and Rangan (1997)) examining competitors' returns after Michael Jordan's announced return to professional basketball, but that study finds "only very weak evidence" of a link between an endorser's behavior and competitors' stock market value. For business strategy, the upshot of our finding is that one could view celebrity endorsements as yet another tool for stealing business from competitors.

Important corroborative evidence for these findings, albeit using a completely different method and data set, comes from a recent paper by Chung, Derdenger, and Srinivasan (2011). That paper estimates a structural demand model of the golf ball industry, and uses the Tiger Woods scandal to identify changes in demand. The authors find that demand for Nike golf balls shifts down following the scandal, significantly reducing Nike's flow of profits from selling golf balls. The empirics suggest both that total demand for golf balls fell (i.e., that there is a category effect), and that competitors of Nike experienced relative gains (i.e., that there is a business-stealing effect).

We view our incorporation of Google Insights search intensity into the empirics as particularly promising for future work in marketing. A small but rapidly growing set of papers in finance establishes that Google search intensity is correlated with stock prices more generally (see in particular Da, Engelberg, and Gao (2011) and papers citing that work). But we are aware of no other work showing that search intensity in marketing-related domains like celebrity endorsements also has significant power to explain stock price changes.

Finally, the difference in competitors' returns when we stratify by competitors' "endorsement-intensity" is provocative evidence about how markets price reputation risk associated with celebrity endorsements, and about how events can change perceptions of that risk. The relatively more negative returns for endorsement-intensive competitors suggests that the scandal changed market-wide perceptions of risk associated with investments in celebrity endorsement. We are not aware of any previous work examining this issue, and in the conclusion we discuss the implications of this finding in more detail.

2 Celebrity Endorsements and Firm Stock Market Value

Celebrity product endorsements, and endorsements by professional athletes in particular, are a critical element of brand strategy.[2] The key question from a firm's perspective, of course, is

[2]See, e.g., the many references in Ding, Molchanov, and Stork (2008), and an earlier survey by Erdogan (1999).

whether a celebrity endorsement generates value sufficient to offset its possibly considerable cost. Quantifying that benefit-cost tradeoff is hard, and consequently the question of whether celebrity endorsements are value-enhancing remains open.

Stock market event studies provide one window into measuring the returns associated with celebrity endorsements. A firm's stock price reflects expectations about the discounted value of future economic profits. If retaining a valuable endorser changes those expectations—say, by increasing expected future sales—then an announcement of celebrity endorsement should generate a "kick" in the stock price. Conversely, an adverse (reputation-damaging) event or the departure of a valuable endorser might move those expectations about future profits downward, which should result in a lower stock price.

Another dimension of using stock prices to evaluate celebrity endorsements is risk. As with any investment, there is a chance that an endorsement deal will not pay off, either because a firm initially underestimates the true gain associated with endorsement, or because the added value of the celebrity endorser falls. Investors should treat that "reputation risk" as they would treat any other component of risk in a firm's stock: higher risk is less attractive. Holding the expected level of future profits constant, investors should punish riskier firms with lower stock prices. In the context of celebrity endorsements, that means that any firm with substantive exposure to celebrity risk should be priced accordingly. More important, it means that *changes* in how markets perceive the risk of celebrity endorsements might affect the value of all firms with celebrity reputation risk exposure.

Beyond those straightforward intuitions, there is nuance to the stock market-based method of measuring returns from endorsements. Stock prices reflect changes in expected profit rather than sales or market share. Given that endorsement incurs expenses, it is possible that a celebrity endorsement might reduce profit even as it sparks sales or growth. Put more formally, celebrity endorsements generate economic rents, and the terms of the endorsement deal divide those rents. It is possible that celebrities might bargain away all of the rents that they generate for their sponsors, making sponsorship at best a break-even proposition. On the other hand, higher stock market prices for sponsors indicate that the firm has captured some of the economic rents generated by the endorser/firm partnership. The key question for a firm, then, is whether it is possible (or perhaps likely on average) that firms can capture rents generated by celebrity endorsements.

Another point worth mentioning is that because changes in *expectations* drive changes in stock prices, it is much harder to measure changes in firm value following well-anticipated events. If, for

example, a celebrity endorsement deal is widely anticipated long before its formal announcement, buyers and sellers of the sponsor's stock will have fully priced all of the gains associated with the deal well before the announcement itself, and the actual announcement will change neither expectations nor stock prices. Examining stock price movements around the actual announcement could therefore understate the gains associated with the endorsement deal. That means that the empirically cleanest type of event to use for quantifying changes in firm value is a surprise, whether it is good or bad, because surprises by definition avoid the anticipation problem.

In the context of the identification issue on the front end, it is not surprising that previous studies attempting to link celebrity endorsements and corporate sponsorship to stock market value have found mixed evidence.[3] We are aware of one study examining announcements of "bad news" for celebrity endorsers (including athletes and entertainers); bad news is often, though not always, more of a surprise than announcements of endorsement/sponsorship deals, and therefore provides cleaner identification. In that paper, Louie, Kulik, and Jacobson (2001) find that bad news with little "culpability" for the endorser (such as a career-ending injury) generates gains for sponsors—this is an "any publicity is good publicity" result—while bad news with more culpability (such as a DUI arrest) generates losses.[4] The scandal that we examine falls squarely in the second ("more culpability") class.

Previous studies also may contain mixed findings for two other reasons. First, it is probably true that while some firms may capture rents when they sign celebrity endorsers, others may not. Some celebrities may command payments that completely offset any incremental profit generated for the sponsor firm. And second, some firms may simply overestimate the gains associated with an endorsement deal; by a winner's curse logic, those firms should in fact be the ones who sign celebrities more often.

One advantage in our case is that the scandal represented a surprise. Before the accident, Tiger Woods was widely acknowledged to have the most valuable "brand" of any athlete in the world—a fact accruing both from his athletic success and from his clean public image. Until 2009 he routinely

[3] Farrell, Karels, and Montfort (2000) find that Tiger Woods' endorsement deal announcements generated stock market value for Nike, but not for American Express or Fortune (Titleist). Agrawal and Kamakura (1995), Mishra, Jr, and Bhabra (1997), Miyazaki and Morgan (2001), Pruitt, Cornwell, and Clark (2004) and Samitasa and Kenourgiosb (2008) find that endorsements/sponsorships generate positive stock market returns. Mathur, Mathur, and Rangan (1997) find that Michael Jordan's return to professional basketball generated positive returns for his sponsors. find that celebrity endorsements generate positive stock market returns for a wide set of celebrities. On the other hand, Fizel, McNeil, and Smaby (2008), Farrell and Frame (1997), Clark, Cornwell, and Pruitt (2009), Cornwell, Pruitt, and Ness (2001) and Ding, Molchanov, and Stork (2008) find weaker evidence, or even evidence (in the case of Olympic sponsorships) negative returns following endorsement/sponsorship announcements.

[4] That paper also adds to an interesting set of studies asking how negative information about an endorser affects brand perception and firm value. See, e.g., Till and Shimp (1998).

placed in the top 5 of the Forbes "Celebrity 100" list of most influential celebrities world-wide. So our setting is certainly one in which stock prices might plausibly reveal the economic object of interest, because there is no evidence that the market anticipated any of the bad news associated with the scandal. The flipside of that, and a limitation of our approach, is that while our method can estimate by how much sponsors' expected future profits fall after the scandal, it cannot estimate the gain in expected future profits that firms initially experienced from the endorsement deal.

Another benefit associated with our example is that Tiger Woods endorses several products rather than just one. This allows us to estimate stock market effects across a wide set of otherwise unrelated firms, and gives us more statistical power than one would have if the estimates were confined to a single sponsor firm.[5] Comparing returns for many sponsors associated with a single endorser can shed light on the circumstances in which endorsement deals are profitable for firms, as long as one properly controls for the contemporaneous correlation in errors across sponsor firms.

We can further improve the power of our tests by exploiting information about how returns and information co-move (or do not co-move) during the time period of the scandal. Although the scandal was a surprise, news related to the scandal, and endorsement-related news in particular, disseminated gradually after the date of the accident, and did so in a way we can measure both quantitatively and qualitatively. As we discuss below, of the fifteen trading days following the accident only three or four were days on which there was significant endorsement-related news; the other days were largely quiet. Our Google search intensity data, which we describe below, confirm this view by identifying clear peak periods of interest coinciding with the timing of endorsement-related news. The endorsement-related activity lags the onset of the broader scandal significantly; for example, Google searches for "Tiger Woods endorsement" did not take off until a few days after the accident, did not peak until ten trading days after the accident, and experienced a third bump on December 14, 2009. Qualitatively identifiable "news days" along with (similarly timed) quantitative measurements of endorsement-related interest allows us to ask whether the pattern of stock price changes during the scandal matches the pattern of news/interest.

The large number of sponsors also allows us to augment the analysis by collecting data for a wide set of competitors to Tiger Woods' sponsors. These data are useful in several ways. They allow us to control for industry-specific factors affecting sponsors' stock prices, because to the extent that competitors and sponsors share industries those factors should also change stock prices for com-

[5] In this respect, our work follows that of Farrell, Karels, and Montfort (2000) and Mathur, Mathur, and Rangan (1997).

petitors. More important, our competitor stock price data allow us to estimate whether sponsors' losses after the scandal are competitors' gains. Whether that is true depends on substitutability between sponsors' products and competitors' products, and the extent to which celebrity endorsements create new demand, or merely steal business from competitors. Understanding whether celebrity endorsement is business-stealing or pure value creation is important both conceptually and for business strategy, but there has been very little empirical work examining the question.[6].

Finally, the dramatic nature of this particular scandal—an extremely damaging set of events for the world's leading endorser—allows us to examine the general role of reputation risk in determining firm value for endorsement-intensive firms in general. As we discussed above, reputation risk should be priced by the stock market. Following the Tiger Woods scandal, the media devoted substantial attention to that risk; for example, a Google search for "celebrity reputation risk" yields stories largely written about Tiger Woods after the scandal. One can argue that the scandal either directly altered perceptions of the level of risk, or that it simply alerted the market to precisely how important reputation risk can be for endorsement-intensive firms. In either event, one might expect a stock market reaction. There is also evidence of a market response, by insurance companies offering protection against celebrity reputation risk; a New York Times article written January 31, 2010 was titled "Insuring Endorsements Against Athletes Scandals," and stated this:[7]

> In the wake of the Tiger Woods scandal, insurers are being inundated with inquiries from corporations seeking to protect their investments, their brands and even their sales when their celebrity endorsers suffer public embarrassment...In a new wrinkle, more companies are trying to insure against the potential loss of sales when an athlete product endorser is involved in a scandal.

Whether the scandal in fact changed market-level perceptions of reputation risk is of course an empirical question. We explore that question by estimating post-scandal stock price changes for two subsets of sponsors' competitors: those who are themselves endorsement-intensive, and those who are not endorsement-intensive. If the scandal sent a market-wide signal about reputation risk, one might expect that risk to affect stock prices for all endorsement-intensive firms, even those who do not have Tiger Woods as an endorser. We test that by comparing competitors' returns

[6] As we noted above, the exceptions are the work by Mathur, Mathur, and Rangan (1997), who find that competitors to Michael Jordan's sponsors experience "very weak" stock price changes after Jordan's return to professional basketball, and the work by Chung, Derdenger, and Srinivasan (2011) showing that competitors of Nike gained golf ball sales after the scandal

[7] http://www.nytimes.com/2010/02/01/sports/01insurance.html.

for the two subsets: if market-wide perceptions about reputation risk changed, one would expect that competitors with endorsement deals would fare relatively worse than competitors without endorsement deals.

3 The Endorsement Deals of Tiger Woods and the Scandal

Prior to November 2009, Tiger Woods' annual endorsement income was estimated to be roughly $100 million, a figure roughly twice as large as that for any other athlete.[8] We are able to identify seven publicly owned, domestically traded companies with which Tiger Woods had an endorsement or sponsorship deal as of November 27, 2009. We list those companies in Table 1.[9] While the details of most contracts are private, the five most valuable contracts were seemingly with Accenture, Gillette, Nike, PepsiCo (Gatorade) and Electronic Arts (EA).[10] Those five deals generated approximately $80-90 million in annual income prior to the scandal. In the empirical work below, we estimate some stock price effects for this subset of "Primary" firms.

It is also worth noting that some sponsors augment the endorsement relationship by making complementary co-investments in product lines, brand name or other assets, the value of which might also be tied to the endorser's reputation. There are three such firms in our sample. Nike has a considerable complementary investment in the Nike golf product line, which did not exist prior to the Tiger Woods endorsement contract. Electronic Arts sells the "EA Tiger Woods" line of video games, and recently launched a new "Tiger Woods Online" video game. Gatorade invested considerable resources in developing a "Tiger Focus" drink.

We draw this distinction because for firms with such co-investments linked to the "Tiger brand," the link between reputation risk and firm value could go beyond the dollar value of the endorsement contract and its short-run effect on sales/profits. Developing and marketing a new product line requires a considerable up-front investment, as well as substantial production and marketing costs. The Nike golf line, for example, is a brand with considerable asset value, accumulated via Nike's substantial up-front and ongoing investment in R&D, physical capital and brand equity. So, for firms with such complementary investments, changes in stock prices will reflect changes in the value of those assets, as well as changes in direct sales associated with the endorsement deal. In the

[8] http://sportsillustrated.cnn.com/more/specials/fortunate50/2009/.

[9] See http://web.tigerwoods.com/sponsors/sponsors for a complete list. Some of the companies on that list are either privately held, or traded on foreign exchanges; we do not track those companies.

[10] See http://industry.bnet.com/advertising/10005016/the-tiger-woods-sponsor-deathwatch-at-nike-digs-in-heels/ for details.

empirical work below we estimate stock price effects for the "Tiger Brand" group of Nike, Electronic Arts and Gatorade: the set of firms with substantial complementary investments associated with Tiger Woods.

3.1 The Timeline of the Scandal

The scandal began with a car accident on the evening of November 27, 2009—a Friday, meaning that the first trading day after the release of "news" was Monday November 30, 2009.[11] Following the night of the accident, several potentially reputation-damaging pieces of information emerged, primarily involving extramarital affairs. Events culminated ten trading days later (December 11, 2009) with Tiger Woods' announcement of an 'indefinite leave' from golf.[12] Table 2 summarizes these events day-by-day, starting one week before the scandal, and ending on December 18, 2009—fifteen trading days after the accident. Beyond the fifteen trading-day horizon we lose statistical precision, so we confine ourselves to this window rather than some longer time period.

As illustrative evidence regarding the rise and decline of media interest in the story, we examine the results of Google Insights searches related to the scandal.[13] Previous work [e.g., Da, Engelberg, and Gao (2011) and follow-on studies] has shown that Google search intensity is correlated with stock price changes, implying that search intensity captures investor attention. Google's Insights data quantify internet interest in a subject on a 100-point scale, as measured by the popularity of keyword searches. Data are normalized search-by-search, with 100 representing peak activity during the search period. To be clear, the scale is informative within a search rather than across searches: within a particular search "100" always implies twice as much search activity as "50," but the peak values of 100 across two different searches may represent different absolute levels of interest.

The most popular three-word search terms following the scandal were "Tiger Woods accident" and "Tiger Woods wife."[14] Figure 1 shows interest in these terms starting on November 26, 2009 and ending on December 18, 2009. Interest in these topics was at zero according to Google Insights before then, suggesting that the pre-accident National Enquirer allegation was not taken

[11] For a timeline and some details about the allegations, see http://www.montrealgazette.com/sports/timeline+Tiger+Woods+decline/3374668/story.html.

[12] One piece of scandal-related news predates the accident by four days: allegations of an affair in the National Enquirer, released on November 23, 2009. We consider the possible effect of that early news in the empirical work below, and find that it does not appear relevant.

[13] One can find the search page here: http://www.google.com/insights/search/.

[14] We observe this by starting with a general search for "Tiger Woods." Given a general starting search, Google Insights shows a rank ordering of the most popular refined search terms associated with the general search.

particularly seriously. Interest in the "accident" search peaks on the day of the accident, then dies out quickly. Interest in the "wife" search builds after the accident and peaks on December 2-3, the latter date being that on which Tiger Woods issued a statement admitting "transgressions." Interest in the "wife" search diminishes until a resurgence on December 8th, then falls again. By December 18th, interest appears to have fully waned. Data over longer post-scandal windows show no resurgence in interest over the next two years.

3.2 The Scandal and Sponsor Firms

Returning to Table 2, we also document endorsement-related news during the scandal. Endorsement-related announcements lag general news about the scandal; the first piece of endorsement-related news came on December 3, when Nike and Gillette issued press releases confirming support for Woods. On December 8, Gatorade announced cancellation of its Tiger Woods-branded sports drink; the announcement came late in the day, after the close of trading.[15] The next pieces of news, clustered on December 11 and over the following weekend, include Accenture dropping Woods, and Gillette announcing that it would "limit" Woods' role in marketing going forward. These pieces of information coincide with the announcement on December 11 of Woods' leave from golf. While we do not extend the window of our analysis beyond December 18 because we have limited statistical power after then, it is perhaps worth noting that AT&T dropped Tiger Woods on December 31, 2009, and Gatorade dropped Woods on February 26, 2010.

Figure 1 sheds light on the relative importance of these events by plotting Google search intensity for the term "Tiger Woods endorsement." That search term takes a value of zero until the day after the accident, and has its first spike on December 3—the Nike/Gillette press release day. Its peak is on December 8/9 following the Gatorade announcement, and interest remains high until after the announcement on December 13 that Accenture was dropping Woods. While the correlation is not perfect, it is high—Google intensity corresponds closely to the pattern of endorsement-related announcements following the scandal.

As further suggestive evidence that the scandal mattered for sponsor firms, we show in Figure 2 the average Google search intensity for our seven sponsor firms between January 2009 and January 2010. We construct two averages. One average uses search intensity based on parent company name and the other uses search intensity based on the brand name endorsed by Tiger Woods (see Table

[15] Whether cancellation was in the offing prior to the scandal is an open question. See, http://www.cnbc.com/id/34330134/Gatorade_Tiger_Discontinued_Not_Tied_To_Events_Company and http://www.dailyfinance.com/2009/12/09/gatorade-drops-tiger-woods-endorsed-drink/.

1 for details). This distinction matters only for two of the seven sponsors (Pepsi/Gatorade and Proctor and Gamble/Gillette). Also, we use "Electronic Arts" as the search term for both parent and brand, because a search for the Tiger Woods-themed golf video game ("Tiger Woods PGA Tour Golf") would spuriously capture broader searches for Tiger Woods. We weight all parents/brands equally in the index.

The shaded area on the figure covers the two weeks of peak interest in the scandal. The brand-specific average peaks during that week, meaning that for our seven brands, this time period was on average the period of greatest worldwide Google search interest over the preceding year. Three of the seven brands in our sponsor group experience the peak (=100) of their 2009 search intensity during the two weeks of the scandal, and AT&T peaks during the week of December 31, when it announced dropping Woods.

The parent-specific pattern is similar, although there are three other time periods in which parent-level intensity exceeds that during the scandal. The first comes during February 22-28, and is driven by a 100 search intensity level for Accenture. That week coincides with the Accenture Match Play Championship, a golf tournament in which Tiger Woods played, and a key part of Accenture's Tiger Woods-related marketing activities. A second peak comes during November 8-14, and is driven by a 100 intensity value for Electronic Arts, which announced a substantial negative earnings report and layoffs during that week.[16] The third peak is during September 20-26 and driven by Gillette; while we can find no corporate announcements by Gillette during that week, the rock band U2 played a concert at Gillette Stadium in Foxborough, Massachusetts, which may have driven spurious interest in "Gillette" as a search term.

Looking at the gap between the parent-specific and brand-specific average lines is also informative. The averages move together quite closely for nearly all of 2009, but deviate by the greatest amount precisely at the peak of the scandal—when interest in the brands relative to the parents would have been highest, based on affiliation with Tiger Woods.

All of this evidence points to a substantive qualitative relationship between the events of the scandal, attention to endorsement values, and interest in sponsor firms. Google intensity correlates quite closely with endorsement-related news, Google intensity for our sponsor firms correlates quite closely with endorsement-related news, and prior work shows that search intensity is correlated with changes in firm value. Our empirical work examines these links more formally.

[16]The "mini-peak" in February 1-7 is also EA-driven and coincides with another negative announcement.

4 Estimated Stock Market Effects of the Scandal

To estimate stock price changes our set of sponsor firms and competitors following November 27 2009, we estimate an event study. Our method is standard in marketing, economics and finance, and as we discuss above has been employed previously in studies linking stock market value to celebrity endorsements.[17]

Our primary specification is:

$$R_{it} = \alpha_i + \beta_i^m R_t^m + \sum_s \delta_s D_{st} + \epsilon_{it}, \tag{1}$$

where,

- R_{it} = the return on shares of sponsor i at time t,
- R_t^m = the return on the Dow Jones value-weighted total market index at time t,
- δ_s = the abnormal return on day s after the accident,
- D_{st} = a dummy variable equal to one during day s after the accident,
- ϵ_{it} = an error term.

The specification is a standard market model where the dependent variable is a sponsor's daily percentage return exclusive of dividends, from Wharton Research Data Services and the Center for Research in Stock Prices (CRSP). The independent variables include a value-weighted total market return. The model allows for sponsor-specific daily mean returns (alphas) and correlations with market/competitor returns (betas). Our estimation window begins three months before the accident date and extends to December 18, 2009. Event date "zero" is November 27, and November 30, 2009 is the first trading day after the event date.

Our model yields estimates of daily abnormal returns, δ_s, which are deviations of actual returns on the days after the scandal from those predicted by the model. We weight observations by market capitalization, effectively estimating the abnormal returns that one would earn by holding a value-weighted portfolio of Tiger Woods' sponsors.[18] We also estimate cumulative abnormal returns (CARs)—which are running sums of the daily abnormal returns—starting on November 30th. The CARs estimate sponsors' total loss over a multi-day window starting on event date one, relative

[17] See, e.g., MacKinlay (1997) for a survey.

[18] Estimating a value-weighted return is more informative than estimating an equally-weighted return, because total dollar gains or losses for shareholders depend on the value-weighted average return. We use daily market capitalization to construct the weights. Results are identical if we use weights as of the event date, or averaged over the month prior to the event date.

to the market returns. In the results below we report abnormal returns and CARs for windows extending up to fifteen trading days after the event date.

When examining the effect of a single event on multiple firms, it is important to adjust the estimated standard errors for the contemporaneous correlation of sponsor-specific errors on the same day. We use the procedure in Salinger (1992) for calculating standard errors on the cumulative abnormal returns. The procedure involves making a simple transformation to the data matrix that yields correct standard errors. We also omit observations for the week preceding November 30, 2009. Including them does not change the results, and we find no evidence of pre-event abnormal returns.

We also estimate specifications including a value-weighted portfolio of competitors' returns:

$$R_{it} = \alpha_i + \beta_i^m R_t^m + \beta_i^c R_{it}^c + \sum_s \delta_s D_{st} + \epsilon_{it}, \tag{2}$$

where all variables are defined as above and

- R_{it}^c = the return on shares of sponsor i's competitors at time t,

The competitor portfolio includes the first ten firms listed by Google Finance as "competitors" of the sponsor—meaning the sponsor's parent company.[19] Table A.1 lists competitors for each sponsor; we include only competitors traded on U.S. stock exchanges.

From a methodological perspective, whether to include competitors' returns is ambiguous. The advantage of including competitors' returns is that it can control more completely for confounding industry-specific contemporaneous influences on sponsors' stock prices. With this in mind we classify competitors based on the parent company rather than the sponsor brand; the ideal match for a particular parent company is another firm that competes in a set of industries identical to those of the sponsor's parent company. Of course, in some cases (e.g., Accenture) the sponsor brand and parent company are identical.

Including competitors' returns may be less correct, on the other hand, if the scandal itself affected competitors' returns. In that case, our estimated abnormal returns for sponsors would be measured relative to competitors rather than the entire market. Conceptually, this changes the interpretation of the estimated abnormal returns from answering "How did sponsors fare relative to the market?" to answering "How did sponsors fare relative to the market and their competitors?"

[19] We have estimated the model using the first five or three competitors, and also using the Yahoo! Finance competitor list. Varying the specification of competitors' returns has no effect on the results. Nor does weighting competitors' returns equally.

The first question implies a counterfactual in which an investor holds the market portfolio, while the second implies a counterfactual portfolio with greater weight on sponsors' industries. The second approach also would complicate a comparison of sponsors' to competitors' abnormal returns during the same period, as it would double-count (or zero out) the effect of changes in competitors' values. For the latter reason in particular, in most of the empirical work below we will present results that estimate sponsors' abnormal returns relative to the market (i.e., the abnormal returns estimated from equation 1 above). We do show the results relative to competitors' returns for completeness.

In some cases we are interested in examining abnormal returns that vary across firms within the same day. We estimate those using the more flexible specification:

$$R_{it} = \alpha_i + \beta_i^m R_t^m + \sum_{is} \delta_{is} D_{st} + \epsilon_{it}, \tag{3}$$

This more flexible specification allows us to conduct non-parametric sign and rank tests regarding the post-event abnormal returns δ_{is}. In both tests the null hypothesis is that post-event abnormal returns are centered on zero, which is what one would expect if the post-event period contains no systematic news about firm value. Rejecting the null suggests that some (either positive or negative) information affected sponsor firms' returns. In these models we also correct for contemporaneous correlation of errors across sponsor firms.

4.1 Primary Results

Table 3 shows estimates of cumulative abnormal returns (CARs) for all sponsors, for the Primary group only (Nike, Gatorade, Electronic Arts, Accenture and Gillette) and for the Tiger Brand group (Nike, Gatorade and Electronic Arts). The first three columns show full results for the model in equation (1) including the market return, and the second three columns show results from the model controling for both market and competitor returns in equation (2). The fit in the second three columns is better, and the competitors' returns explain a share of variation in sponsors' returns that is both statistically and economically significant.[20] The fact that sponsors' and competitors' returns co-move before the event, and materially so, suggests that our definition of "competitor" captures firm- or industry-specific similarity across firms that the market return does not capture—i.e., that competitors are usefully defined.

In every model the point estimates are fairly flat and not statistically significant until eight

[20]The p-value on an exclusion restriction for competitors' returns is less than 0.0001.

trading days after the accident; in every instance the estimates CARs turn sharply negative and remain so until the end of our fifteen-day event window. By and large the estimates are statistically significant, particularly later in the event window and for the Primary and Tiger Brand sub-samples. The point estimates for the smaller sub-groups are also larger (more negative). Referring to the first three columns, in the Primary subsample the 10-(15-)day CAR shows a loss of 3.0%(5.3%), and in the Tiger Brand subsample the 10-(15-)day CAR shows a loss of 3.4%(5.8%).

The results in the second three columns, from the model including competitors' returns, show a similar pattern. The similarity of the point estimates suggests that *average* competitor returns did not move much following the scandal, although below we decompose those average returns and show that certain competitors benefited while others lost value during the scandal.

Figure 3 and Figure 4 provide graphical detail on the pattern of losses over time. Figure 3 shows the cumulative abnormal returns for our three sponsor groups, while Figure 4 shows individual CARs for the Primary group. We do not show CARs for the full set of firms because the CAR for TLC Vision is extremely large and negative, reducing the viewing scale of CARs for all other firms. The large negative CAR for TLC almost certainly foreshadows its bankruptcy declaration on December 21 2009. For our weighted average CARs in the full sample this does not matter much because TLC's weight in the portfolio is trivially small, but it is worth noting. If one weights the portfolio equally, the CARs for portfolios including TLC become more negative after the scandal.

The graphical representations of CARs illustrate two points. One is that CARs turn negative only near the date of the first negative endorsement-related announcement on December 8 2009 (the Gatorade drink cancellation). This is suggestive evidence that our results capture the effects of endorsement-related news. A second point, from Figure 4, is that even Accenture, which has the most positive CAR during the scandal, experiences a decline in value after the first negative endorsement-related news is released.

Table 4 shows daily abnormal returns and presents the results of the sign and rank tests. The main body of the table shows daily abnormal returns for each of our main sponsor groups. These abnormal returns are the individual δ_s coefficients, which are averaged across firms (weighted by firm value). One can see that the largest negative returns occur in two clusters, 3-4 and 8-9 trading days after the onset of the scandal, corresponding to December 2-3 and December 9-10 respectively.

The bottom four rows use the firm-specific daily abnormal returns δ_{is} (not shown in the table) to conduct both sign and rank tests over 10-day and 15-day windows. Again, the null hypothesis in these tests is that returns are centered on zero. The alternative (one-tailed) hypothesis in

each test is that the returns are centered on a negative value, indicating the systematic release of negative information affecting all firms. The sign test uses only information about the sign (positive or negative) of each coefficient, while the rank test uses information about both signs and magnitudes. For the full sponsor group, the p-values for both sign tests are below 0.10. Results for the subsamples are more significant. For the Primary and Tiger Brand both sign test p-values are below 0.05. The pattern for the rank tests is similar. In all, these results provide strong evidence that abnormal returns after the scandal are systematically negative, particularly for the Primary/Three groups.

4.2 Endorsement-related News, Search Intensity and Abnormal Returns

We now tie the day-by-day pattern of abnormal returns from Table 4 to the patterns of news/search behavior we documented in Table 2 and Figure 1. This analysis corroborates the view that our estimated abnormal returns are related to the Tiger Woods scandal, rather than some other factor(s).

We first approach the question graphically. Figure 2 plots the Google Insights index for "Tiger Woods endorsement" over trading days 1-15 in the event window. On the same axis we also plot the negative of average abnormal returns for sponsor firms over the event window, using our standard groupings of sponsors; each point on the figure corresponds to one coefficient from the first three columns of Table 4. Plotting the negative of abnormal returns makes easier the visual comparison between higher (more positive) search intensity and larger (more negative) abnormal returns for sponsor firms.[21] The figure shows a strong link between Google search intensity and daily abnormal returns. Search intensity peaks on December 9, and that is the day with the largest (negative) abnormal return for any group of firms. Day-by-day movements up/down in search intensity also correlate with abnormal returns.

We next undertake a more formal statistical analysis linking endorsement-related news/search intensity to the magnitude of abnormal returns. The model for this analysis is:

$$\hat{\delta}_{is} = \alpha + \beta News_s + \epsilon_{is}, \tag{4}$$

where,

[21] Specifying the relationship this way maintains the assumption that all news during the event window had a negative effect. We have also constructed, but do not present here, a figure correlating search intensity with the absolute value of returns; that assumes that search intensity could lead to large abnormal returns in either direction. That figure looks quite similar, because most of the largest daily returns are negative.

- $\hat{\delta}_{is}$ = the estimated abnormal return on shares of firm i on event date s from equation (1),
- $News_s$ = a time-varying measure of news/search intensity,
- ϵ_{is} = an error term.

With seven firms and fifteen trading days during the event window, we have a total of 105 observations for these regressions when all sponsor firms are included, and 75/45 observations for the Primary/Tiger Brand subsamples.

To fully explore the relationship between search/news intensity and abnormal returns, we use three different measures of news/search intensity. The first is the level of search intensity for "Tiger Woods endorsement" from Google Insights, as shown on Figures 1 and 5, re-scaled to be between zero and one (rather than between 1 and 100). This takes on a minimum value of 0.07 (on November 30) and a maximum value of 1.00 (on December 9). Our second measure of search intensity is an indicator taking on a value of one on days with a Google Insights score above 25 (0.25), and zero otherwise; that occurs on December 2, 3, 8, 9, 10, 11, 14, 15 and 17 of 2009.[22] Finally, we include a qualitative indicator, self-defined, equal to one on the "endorsement-related news days" identified in Table 2: December 3, 8, 9 and 14.

Table 5 presents results from these models. With every specification of news/search intensity, the coefficients show more negative abnormal returns on days of greater news/search intensity. The effects are larger for the Tiger Brand firms than for the sample as a whole. In the first set of rows, the point estimates imply negative abnormal returns of 0.7%-2.6% on days with search intensity equal to 1.00, relative to days with search intensity equal to 0.00. The second set of rows shows negative abnormal returns of 0.4%-1.0% on days with search intensity greater than 0.25. And finally, the coefficients in the last set of rows imply negative abnormal returns of 0.2%-1.4%.

Two important patterns emerge in these results. First, the correlation between news/search intensity is much stronger for the "Tiger Brand" firms than for the other firms in the set of sponsors—note the significantly higher r-squared terms in the last column of results. This is what one would expect if the results reflect the downside of the scandal and the Tiger Brand firms had more at stake. Second, and perhaps more important, our objectively measured search intensity variable (the Google Insights measure) significantly outperforms our qualitative and subjectively-defined "news day" measure, in terms of fitting the pattern of abnormal returns. This is a promising

[22] We have also tried other cutoffs such as 0.50 or 0.75, or sets of indicators based on quartile cutoffs; the results are qualitatively similar. We present results using the 0.25 cutoff here because it is generous relative to the other two measures in the table in terms of classifying "high" intensity, and therefore provides a useful comparison to those narrower measures.

result in the context of event studies that attempt to explain abnormal returns, because the Google Insights-based variable avoids issues related to researcher-defined measures of which days after an event are "important."

As a robustness check, we show in Table A.2 the results of similar models that use other search terms related to the scandal. The first two sets of rows use the search intensity for the "Tiger Woods accident" search, and the second sets of rows use the "Tiger Woods wife" search.[23] We show two specifications for each alternative search measure: one including the "Tiger Woods endorsement" search intensity (from Table 4) and one omitting that variable.

The results show quite clearly that while endorsement-related search intensity correlates quite strongly with sponsors' abnormal returns, non-endorsement-related but still scandal-related search intensity is unrelated to the pattern of abnormal returns. The more general scandal-related search terms are closer to zero in point terms, and never statistically significant. Furthermore, their inclusion leaves the magnitude and significance of the endorsement-related coefficient unchanged. This provides further evidence that our findings reflect something specific to the endorsement-related effect of the scandal.

4.3 Competitor Returns and Endorsement Intensity

In this section, we examine returns for our sponsors' competitors. For each of the seven firms in our sponsor sample we collect daily return data for ten competitors, meaning that we examine returns for as many as seventy competitors in the work below. Some competitors move in or out of the sample during the estimation window, are not traded on a U.S. exchange, or are one of our sponsors, meaning that we do not always have data for all seventy firms.

Our analysis of competitors' returns focuses on two questions. First, we ask whether the scandal appears to generate abnormal returns for competitors. One might imagine that losses for sponsor firms could be gains for rivals of sponsors, if celebrity endorsements lead to business-stealing and that business-stealing reverses after a scandal. Alternatively, it is possible that losses for sponsors would not affect competitors' returns, if celebrity endorsements simply create new value in a market (perhaps relative to other markets, perhaps not). It might even be possible that one firm's losses could spill over to all competitors in a "category," although this is perhaps more plausible for some products (e.g., golf balls) than for others (e.g., sports drinks).

[23] We have also estimated the model using the more general "Tiger Woods" search; that tracks "Tiger Woods wife" quite closely and yields similar results.

A second question is whether those competitors who are themselves endorsement-intensive, meaning that they also use celebrity endorsements as part of their marketing efforts, fared differently from those competitors with no links to celebrities. The purpose of the second test, as we note above, is to test for broader impacts of the Tiger Woods scandal. Given the prominence of Tiger Woods as an endorser and his arguably impeccable reputation prior to the scandal, it is possible that the scandal sent a negative market-wide signal about risk associated with *any* endorsement deal. We classify a competitor as "endorsement intensive" if a Google search for "[competitor name] celebrity endorsement" reveals that the competitor has at least one celebrity endorsement deal during our event window. Table A.1 lists our competitors and whether we classify them as endorsement-intensive. This is probably conservative, in the sense that relatively few of these firms are as endorsement-intensive as the large firms that Tiger Woods endorses.[24]

The model for this analysis is the standard market model:

$$R_{it}^{c} = \alpha_i + \beta_i^{c} R_t^{m} + \sum_{s} \delta_s^{c} D_{st} + \epsilon_{it}, \tag{5}$$

where,

- R_{it}^{c} = the return on shares of competitor i at time t,
- R_t^{m} = the return on the CRSP equally-weighted portfolio at time t,
- δ_s^{c} = the abnormal return for competitor i from day s after the accident,
- D_{st} = a dummy variable equal to one during day s after the accident,
- ϵ_{it} = an error term.

The specification allows for competitor-specific daily mean returns (alphas) and correlations with market returns (betas). We weight the returns by competitor value (market capitalization). We estimate competitors' returns for all competitors, as well as competitors to the Primary/Tiger Brand groups.

Table 6 shows ten-day CARs for the competitor sample. The first three columns show returns for competitors who are not endorsement-intensive. Competitors' CARs are positive, and rise as sponsors' returns fall—with the greatest changes occurring by day ten. This pattern dovetails with the gradual onset of negative CARs for sponsors, and with the timing of endorsement-related news, corroborating the view that competitors' gains are sponsors' losses. The point estimates grow in size as we restrict the sample to competitors of the Primary and Tiger Brand groups, which is also

[24] We experimented with several ways of classifying endorsement intensity, with little variation in the qualitative results.

consistent with the pattern of sponsors' losses.[25]

The more interesting results are those in the next six columns, which show that endorsement-intensive competitors fared significantly worse than non-intensive competitors. The middle three columns show that after event day two non-intensive competitors' returns turn negative, and are statistically significantly negative on day 14. More important, the difference between returns for endorsement-intensive and non-intensive competitors is economically meaningful and statistically significant, at least for the Primary/Three sub-samples. For the Primary subsample the CARs are significant at 10% or 5% on all days after trading day 8 (December 9 2009), and range from -2.1% to -3.3% in point terms, meaning that endorsement-intensive competitors lost roughly 2-3% of value relative to their non-intensive competitors. The point estimates are larger for Tiger Brand competitors but less significant statistically, reflecting the smaller sample size.

The relative gains for competitors without endorsement deals suggest the losses for sponsor firms were at least in part gains for competitors—in other words, that celebrity endorsements transfer value across firms. But the fact that being endorsement-intensive was treated more harshly in the market suggests a second effect—that the scandal sent a negative market-wide signal, as suggested in the New York Times article above, about the possible downside of celebrity endorsements. For endorsement-intensive competitors, the net effect of the business-stealing effect (a gain) and the reputation risk effect (a loss) appears to be nearly a wash. If we pool all competitors the average CARs for the pooled group are close to (and not significantly different from) zero.

To confirm that our findings for competitors are endorsement-related, we estimate a series of regressions of the form

$$\hat{\delta}_{is}^{c} = \alpha^{c} + \beta^{c} News_{s} * Endorse_{i} + \epsilon_{is}, \tag{6}$$

where,

- $\hat{\delta}_{is}$ = the estimated abnormal return on shares of firm i on event date s from equation (1),
- $News_s$ = a time-varying measure of news/search intensity,
- $Endorse_i$ = an indicator equal to one if the competitor is endorsement-intensive,
- ϵ_{is} = an error term.

The specification mirrors that in Table 5; it estimates the link between abnormal returns and

[25] The difference in sponsors' abnormal returns when measured relative to competitors need not equal competitors' abnormal returns. The net difference depends both on the level of competitors' returns, and on the correlation between sponsors' and competitors' returns.

measures of news/search intensity. We allow the relationships to differ for endorsement-intensive and non-intensive competitors by including an interaction term.

Table 7 shows the results of these models. The broad pattern is of a positive and statistically significant relationship between endorsement-related news/search intensity and abnormal returns for the baseline set of non-intensive competitors, and a relationship for endorsement-intensive competitors that is significantly less positive and close to zero on net. The effects estimated in this table are generally smaller than those estimated for sponsors. In short: competitors' returns during the scandal are greatest precisely when sponsors' losses are greatest, unless the competitors themselves are endorsement-intensive.

In the top rows, the All and Tiger Brand coefficients show a positive and significant relationship between the continuously measured "Tiger Woods endorsement" search intensity variable and abnormal returns for non-intensive competitors. Those coefficients are also positive and significant for all groups using the discrete "intensity>0.25" variable. They are smaller and less significant using our qualitative self-defined "news days" variable. The pattern for the interaction terms is similar, in terms of size and significance. The interaction terms measure the difference between returns for non-intensive and endorsement-intensive competitors—the sum of the two coefficients measures the net effect on endorsement-intensive competitors. We also observe, as we did with sponsors' abnormal returns, that the quantitative intensity measures from Google Insights correlate more strongly with abnormal returns than does our self-defined "endorsement-related news day" variable.

The overall pattern of results is summarized by Figure 4, which highlights the differences between our three groups of affected firms: sponsors, competitors with endorsement deals, and competitors without endorsement deals.[26] The relative differences across the groups are economically meaningful; the scandal appears to have had far-reaching and substantive effects on a large set of firms.

While we do not report the results, we have also estimated a model that pools all sponsors and competitors, and estimates overall (value-weighted) effects on the "category portfolio." These models show negative, small (less than 1%) and borderline statistically significant effects overall. In other words, the net effect on this entire set of firms is a small and weakly significant loss in value, with significant "within-category" transfers from sponsor firms to non-intensive competitors of sponsor firms. These results are broadly consistent with the results in Chung, Derdenger, and Srinivasan (2011) from the golf ball market.

[26]The sponsor coefficients here are those from the model without competitors' returns, to avoid double-counting.

4.4 Robustness Checks and Caveats

While we do not present them here, we have conducted a variety of robustness checks. We have estimated the models using a variety of event windows, with little effect on the results.[27] We have estimated models that include the pre-event week, or drop up to a month's worth of pre-event data. We have varied the weighting scheme (using time-invariant market capitalization weights, for example). These modifications to the specification do not change the results.

Another robustness issue arises because PepsiCo announced a negative earnings revision on December 9, 2009, and one might worry that the announcement contaminates our results. In unreported specifications (which we show in an earlier working paper version), we break our 'Tiger Brand' subsample of EA, Nike into two groups: PepsiCo and the other two firms. The abnormal return for PepsiCo on December 9 is indeed negative and significant, but so are abnormal returns for the other two firms, and the point estimates are very close. While one cannot rule out a negative stock price effect of the announcement for PepsiCo, the pattern of results is consistent with the release on December 9 of bad news common to Nike, EA and PepsiCo. Furthermore, the p-values for the sign and rank tests using only EA and Nike returns are both below 0.05 over the 10-day window, and are much larger for PepsiCo, which experienced several fairly large positive returns during the event window.

A final point concerns interpretation of the results. Ideally, one would want to interpret any abnormal returns as measuring percentage changes in the expected value of future economic profits. In our case that is hard, if not impossible, for a few reasons. Most of our sponsor firms are large multi-product firms, for which Tiger Woods endorses only a single product; Nike produces many products outside its golf line, for example. Nike's stock price, of course, reflects expectations about its profits from all business lines. So, the percentage change in profits will be weighted by the shares of economic profits flowing from "Tiger-related" products and "non-Tiger-related" products. One could proxy for those shares using dollar values of sales—Nike golf, for example, represents roughly ten percent of annual sales for Nike—but there is no guarantee that shares of *expected future profit* correspond to shares of *current dollar sales*. Another complicating factor is that if the scandal sent a market-wide signal about celebrity reputation risk, then even the non-Tiger-related business lines might suffer. That would be particularly true for a company like Nike, which is one of the most celebrity endorsement-intensive firms in the world. For these reasons, we try to be as structure-free

[27] An earlier working paper version and a later auxiliary table prepared for referees, available upon request, show results.

in the econometric model as possible; the caveat is that our results should be taken as indicating the direction and overall dollar value (percentage change $\times$ market capitalization) of abnormal returns, but should not be taken as indicating percentage changes in Tiger-related economic profit. This is particularly important when comparing gains/losses across firms, for which "Tiger-related" gains/losses and shares of economic profits may be very different.

5 Discussion and Conclusion

The Tiger Woods scandal provides a unique opportunity to understand more about the relationship between stock market value and celebrity endorsements. Our first result confirms a direct dimension of that link: the market value of Tiger Woods' sponsors fell substantively after the scandal broke, relative to the market values of firms without such endorsement deals. That finding is informative in the context of the mixed evidence from previous work.

Beyond that, we shed light on some previously under-studied aspects of the endorsement/stock price relationship. Firms with substantial co-investments in new products linked to the "Tiger brand" suffered greater declines in value, presumably reflecting declines in the asset values or brand equity associated with those products. This result highlights a further downside risk of pairing celebrity endorsements with endorser-specific investments in products or branding. We do not estimate whether our results reflect long-run declines in value, due to the limited statistical power of longer-run tests, but we have no evidence over as long as one month after the scandal of any reversion in prices. The efficient markets hypothesis would suggest that markets should immediately price the downside of scandals correctly on average; of course, that need not have been the case in this specific instance. Further work using more data from a broader set of scandals might be able to shed light on whether there is any systematic under-reaction or over-reaction to celebrity scandals.[28]

We also relate novel auxiliary data from Google Insights to abnormal returns during the scandal. The level of interest in the search term "Tiger Woods endorsement" explains nearly forty percent of the variation across firms and days in abnormal returns following the scandal, and does so in an intuitive way. The search intensity variable significantly outperforms our own qualitative measure of which days were endorsement-newsworthy, suggesting promising avenues for future research.

[28] We know of no work on that particular question, although previous work (see, e.g., Bernard and Thomas (1989) and follow-on work) has shown that markets might under-react to other value-changing events such as earnings announcements.

Our estimates of competitors' gains represent new evidence regarding how far-reaching the stock market effects of celebrity endorsements can be. Competitors to sponsor firms measurably gained value after the scandal, relative to the rest of the market. That finding has implications for business strategy, in that competitors' endorsement deals are one more factor affecting firm value, and can transfer value across firms.

Finally, we find compelling evidence that how competitors fared during the scandal depended on whether they also had celebrity endorsers or not; this result is confirmed by the post-event relationship between competitors' abnormal returns and endorsement-related news/search intensity. Along with the anecdotal evidence regarding how the scandal altered perceptions of celebrity endorsement reputation risk, this evidence suggests a regime change in how equity markets priced reputation risk. Whether that regime change persists is an open question, but if insurance companies indeed start offering "reputation risk insurance" then that view will have passed a convincing market test.

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6 Tables

Table 1: Sponsor Firms, Endorsement Contracts and Market Value

Sponsor	Parent Company	Endorsement value (/yr.)	Market Cap
Nike	Nike	$20-30 million	$32 Billion
Gatorade	Pepsico	$20 million	$95 Billion
Accenture	Accenture	$20 million	$26 Billion
Gillette	Procter and Gamble	$15 million	$179 Billion
Tiger Woods PGA Tour Golf	Electronic Arts	$8 million	$5.76 Billion
AT&T	AT&T	n/a	$165 Billion
TLC Laser Eye Centers	TLC	n/a	$4.04 Million

Notes: We include all sponsors for which we can obtain stock price data. Market cap values are as of mid-December 2009. AT&T's relationship with Woods involves sponsoring a golf tournament and charity events, in exchange for product placement (e.g., on Tiger Woods' golf bag).

Table 2: Chronology of Scandal- and Endorsement-related News

Date	Trading Day	Scandal-related news	Endorsement-related news
November 23, 2009		National Enquirer report: affair with Rachel Uchitel.	
November 24, 2009			
November 25, 2009			
November 26, 2009			
November 27, 2009		Date of accident	
November 28, 2009			
November 29, 2009		Transcript of 911 call by neighbor released.	
November 30, 2009	1		
December 1, 2009	2		
December 2, 2009	3	Jaimee Grubbs and Kalike Moquin named as mistresses. Woods issues first public statement admitting "transgressions."	
December 3, 2009	4		Nike, Gillette issue press releases confirming support
December 4, 2009	5		
December 5, 2009		Jamie Jungers comes forward as mistress.	
December 6, 2009		Cori Rist and Mindy Lawton named as mistresses.	
December 7, 2009	6	Holly Sampson named as mistress, bringing total to seven.	
December 8, 2009	7	Woods' mother-in-law rushed to the hospital from Woods' home.	Gatorade drops Tiger Woods-branded drink (after clos
December 9, 2009	8		
December 10, 2009	9		
December 11, 2009	10	Woods announces he will take an "indefinite" leave from golf	Accenture removes Woods' image from its Web site.
December 12, 2009			Gillette announces that it is "limiting" Woods' role in
December 13, 2009			Accenture drops Woods.
December 14, 2009	11		
December 15, 2009	12		
December 16, 2009	13		
December 17, 2009	14		
December 18, 2009	15		

Sources: http://sports.espn.go.com/golf/news/story?id=4922436 and http://gawker.com/5421795/the-tiger-woods-saga-a-definitive-timeline.
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http://socyberty.com/people/nike-ea-sports-pg-to-drop-tiger-woods-endorsements/

Notes: Dates in italics are weekend days (non-trading days). AT&T dropped Woods on December 31, 2009. Gatorade dropped Woods on February 26, 2010.

Table 3: Cumulative Abnormal Returns for Sponsor Firms

Relative to:	Market only			Market, competitors		
Days after event	All Firms	Primary	Tiger Brand	All Firms	Primary	Tiger Brand
One	-0.004	-0.004	-0.004	-0.002	-0.003	-0.002
	(0.004)	(0.004)	(0.006)	(0.004)	(0.004)	(0.006)
Two	0.001	0.001	0.012	0.001	-0.001	0.009
	(0.005)	(0.006)	(0.009)	(0.005)	(0.006)	(0.008)
Three	0.003	0.001	0.007	0.003	-0.002	0.006
	(0.007)	(0.008)	(0.011)	(0.006)	(0.008)	(0.010)
Four	0.001	-0.007	-0.004	0.001	-0.009	0.001
	(0.008)	(0.009)	(0.013)	(0.007)	(0.009)	(0.012)
Five	0.003	-0.005	0.004	0.005	-0.007	0.008
	(0.009)	(0.010)	(0.014)	(0.008)	(0.010)	(0.013)
Six	0.007	-0.006	0.008	0.010	-0.007	0.011
	(0.010)	(0.011)	(0.016)	(0.009)	(0.011)	(0.015)
Seven	0.000	-0.011	0.000	0.002	-0.012	0.003
	(0.010)	(0.012)	(0.017)	(0.010)	(0.012)	(0.016)
Eight	-0.008	-0.022	-0.027	-0.009	**-0.022***	-0.024
	(0.011)	(0.013)	(0.018)	(0.011)	**(0.013)**	(0.017)
Nine	-0.007	**-0.024***	-0.027	-0.010	**-0.027****	-0.029
	(0.012)	**(0.014)**	(0.020)	(0.012)	**(0.014)**	(0.018)
Ten	-0.009	**-0.030****	-0.034	-0.011	**-0.035****	**-0.039****
	(0.013)	**(0.015)**	(0.021)	(0.012)	**(0.015)**	**(0.020)**
Eleven	-0.010	**-0.031***	**-0.040***	-0.011	**-0.034****	**-0.042****
	(0.014)	**(0.016)**	**(0.022)**	(0.013)	**(0.015)**	**(0.021)**
Twelve	-0.019	**-0.039****	-0.038	-0.018	**-0.042****	**-0.040***
	(0.014)	**(0.017)**	(0.023)	(0.014)	**(0.016)**	**(0.022)**
Thirteen	-0.023	**-0.042****	**-0.044***	-0.020	**-0.042****	**-0.040***
	(0.015)	**(0.018)**	**(0.024)**	(0.014)	**(0.017)**	**(0.023)**
Fourteen	**-0.028***	**-0.047****	**-0.051****	-0.021	**-0.042****	**-0.037**
	(0.016)	**(0.019)**	**(0.025)**	(0.015)	**(0.018)**	**(0.024)**
Fifteen	**-0.032***	**-0.053*****	**-0.058****	-0.024	**-0.047****	**-0.041***
	(0.016)	**(0.019)**	**(0.027)**	(0.016)	**(0.019)**	**(0.025)**
Observations	605	435	261	605	435	261
R-squared	0.291	0.314	0.336	0.360	0.375	0.433

Notes: Coefficients are cumulative abnormal returns (CARs) weighted by firm value (market capitalization). First three columns show results of the market model in equation (1). Second three columns show results of the market model including competitors' returns. Event date is November 27, 2009. Estimation window begins three months before event date, and ends one week before event date. Standard errors are adjusted for contemporaneous correlation across firms. "All firms" include all listed in Table 1. "Primary" includes Nike, EA, Accenture, PepsiCo (Gatorade) and P&G (Gillette). "Tiger Brand" includes Nike, EA and PepsiCo. Numbers in parentheses are standard errors. Asterisks indicate significance at 10% (*), 5%(**) and 1%(***) or better.

Table 4: Average Daily Abnormal Returns for Sponsor Firms

Days after event	All Firms	Primary	Tiger Brand
One	-0.004	-0.004	-0.004
	(0.004)	(0.005)	(0.006)
Two	0.005	0.006	**0.016****
	(0.004)	(0.005)	**(0.006)**
Three	0.002	-0.001	-0.005
	(0.004)	(0.005)	(0.006)
Four	-0.002	**-0.008***	**-0.011***
	(0.004)	**(0.005)**	**(0.006)**
Five	0.001	0.001	0.008
	(0.004)	(0.005)	(0.006)
Six	0.004	-0.000	0.004
	(0.004)	(0.005)	(0.006)
Seven	**-0.007***	-0.006	-0.008
	(0.004)	(0.005)	(0.006)
Eight	**-0.008****	**-0.011****	**-0.027*****
	(0.004)	**(0.005)**	**(0.006)**
Nine	0.000	-0.002	-0.000
	(0.004)	(0.005)	(0.006)
Ten	-0.001	-0.006	-0.007
	(0.004)	(0.005)	(0.006)
Eleven	-0.001	-0.001	-0.006
	(0.004)	(0.005)	(0.006)
Twelve	**-0.009****	-0.007	0.002
	(0.004)	(0.005)	(0.006)
Thirteen	-0.003	-0.003	-0.006
	(0.004)	(0.005)	(0.006)
Fourteen	-0.005	-0.005	-0.007
	(0.004)	(0.005)	(0.006)
Fifteen	-0.004	-0.007	-0.006
	(0.004)	(0.005)	(0.006)
Observations	553	395	237
R-squared	0.290	0.316	0.329
10-day sign test p-value	0.061	0.026	0.008
15-day sign test p-value	0.030	0.013	0.013
10-day rank test p-value	0.136	0.025	0.004
15-day rank test p-value	0.036	0.014	0.017

Notes: Coefficients are abnormal returns weighted by firm value, estimated using the model in equation (1). Event date is November 27, 2009. Standard errors are adjusted for contemporaneous correlation across firms. "All firms" include all listed in Table 1. "Primary" includes Nike, EA, Accenture, PepsiCo (Gatorade) and P&G (Gillette). "Tiger Brand" includes Nike, EA and PepsiCo. Numbers in parentheses are standard errors. Asterisks indicate significance at 10% (*), 5%(**) and 1%(***) or better. Shaded cells indicate negative values. Sign and rank tests p-values use the full set of firm-day-specific abnormal returns, estimated using the model in equation (2). For the sign and rank tests the null hypothesis is that returns are centered on zero.

Table 5: Sponsors' Abnormal Returns and News/Search Intensity

Dependent variable: Firm-level daily abnormal return			
	All Firms	Primary	Tiger Brand
"Tiger Woods endorsement" search intensity	**-0.007***	**-0.007***	**-0.024*****
	(0.003)	**(0.004)**	**(0.006)**
Constant	0.001	-0.001	**0.006***
	(0.001)	(0.002)	**(0.003)**
R-squared	0.048	0.056	0.306
"Tiger Woods endorsement" search intensity>25	**-0.004***	**-0.004***	**-0.010****
	(0.002)	**(0.002)**	**(0.003)**
Post-accident dummy	0.000	-0.001	0.002
	(0.001)	(0.001)	(0.002)
R-squared	0.046	0.057	0.182
Endorsement-related news day	-0.001	-0.004	**-0.012*****
	(0.002)	(0.002)	**(0.003)**
Post-accident dummy	-0.002	**-0.002***	-0.000
	(0.001)	**(0.001)**	(0.002)
R-squared	0.006	0.042	0.228
Observations	105	75	45

Notes: Coefficients are from model (3) in text, modeling the relationship between firm-level daily abnormal returns during the period [November 30, December 18] and three different measures of endorsement-related news intensity. First set of rows use the level of "Tiger Woods endorsement" search intensity on a [0, 1] scale to measure endorsement-related news. Second set of rows use an indicator equal to one if "Tiger Woods endorsement" intensity exceeds 0.25, and zero otherwise. Third set of rows use indicator variables equal to one on December 3, December 9, December 11 and December 14; see Table 1 for details. Numbers in parentheses are standard errors. Asterisks indicate significance at 10% (*), 5%(**) and 1%(***) or better.

Table 6: CARs for Competitors, by Endorsement Intensity

	Not endorsement intensive			Endorsement intensive			Difference		
Days after event	All Firms	Primary	Tiger Brand	All Firms	Primary	Tiger Brand	All Firms	Primary	Tiger Brand
One	**-0.003***	-0.002	**-0.009*****	-0.000	-0.000	-0.000	0.003	0.002	0.009
	(0.002)	(0.002)	**(0.003)**	(0.003)	(0.003)	(0.004)	(0.003)	(0.003)	(0.006)
Two	-0.001	**0.004***	-0.006	**0.008***	**0.008***	**0.011****	**0.009****	0.004	**0.017****
	(0.002)	**(0.003)**	(0.005)	**(0.004)**	**(0.004)**	**(0.005)**	**(0.004)**	(0.005)	**(0.008)**
Three	-0.001	**0.006***	-0.009	-0.002	-0.002	0.002	-0.000	-0.008	0.011
	(0.003)	**(0.003)**	(0.006)	(0.006)	(0.006)	(0.007)	(0.005)	(0.006)	(0.010)
Four	0.004	**0.011*****	-0.006	-0.001	-0.001	0.000	-0.004	-0.011	0.007
	(0.003)	**(0.004)**	(0.007)	(0.006)	(0.006)	(0.008)	(0.006)	(0.007)	(0.012)
Five	-0.000	**0.011*****	0.001	-0.001	-0.001	-0.001	0.001	-0.010	-0.002
	(0.004)	**(0.004)**	(0.007)	(0.007)	(0.007)	(0.009)	(0.007)	(0.008)	(0.013)
Six	-0.002	0.007	0.005	-0.007	-0.007	-0.005	-0.002	-0.012	-0.008
	(0.004)	(0.004)	(0.008)	(0.008)	(0.008)	(0.009)	(0.008)	(0.008)	(0.014)
Seven	-0.001	0.004	0.002	-0.011	-0.011	-0.009	-0.007	-0.013	-0.009
	(0.005)	(0.005)	(0.009)	(0.009)	(0.009)	(0.010)	(0.008)	(0.009)	(0.016)
Eight	0.008	0.008	0.006	-0.008	-0.008	-0.009	-0.012	-0.013	-0.013
	(0.005)	(0.005)	(0.010)	(0.009)	(0.009)	(0.011)	(0.009)	(0.010)	(0.017)
Nine	**0.012****	**0.017*****	**0.022****	-0.007	-0.007	-0.006	-0.015	**-0.021***	-0.027
	(0.005)	**(0.006)**	**(0.010)**	(0.010)	(0.010)	(0.012)	(0.010)	**(0.011)**	(0.018)
Ten	**0.011****	**0.019*****	**0.026****	-0.010	-0.010	-0.007	**-0.017***	**-0.026****	**-0.032***
	(0.006)	**(0.006)**	**(0.011)**	(0.011)	(0.011)	(0.013)	**(0.010)**	**(0.011)**	**(0.019)**
Eleven	**0.011***	**0.021*****	**0.021***	-0.009	-0.009	-0.007	-0.016	**-0.026****	-0.026
	(0.006)	**(0.006)**	**(0.012)**	(0.011)	(0.011)	(0.013)	(0.011)	**(0.012)**	(0.020)
Twelve	0.006	**0.019*****	**0.027****	-0.008	-0.008	-0.009	-0.010	**-0.023***	-0.034
	(0.006)	**(0.007)**	**(0.012)**	(0.012)	(0.012)	(0.014)	(0.011)	**(0.012)**	(0.021)
Thirteen	0.006	**0.019*****	**0.029****	-0.009	-0.009	-0.013	-0.010	**-0.024***	**-0.040***
	(0.007)	**(0.007)**	**(0.013)**	(0.012)	(0.012)	(0.015)	(0.012)	**(0.013)**	**(0.022)**
Fourteen	0.003	**0.016****	**0.028****	**-0.022***	**-0.022***	**-0.029***	-0.019	**-0.033****	**-0.054****
	(0.007)	**(0.007)**	**(0.013)**	**(0.013)**	**(0.013)**	**(0.015)**	(0.013)	**(0.014)**	**(0.023)**
Fifteen	0.009	**0.024*****	0.022	-0.008	-0.008	-0.017	-0.010	**-0.026***	-0.036
	(0.007)	**(0.008)**	(0.014)	(0.013)	(0.013)	(0.016)	(0.013)	**(0.014)**	(0.024)
Observations	3355	2328	1106	869	869	632	4224	3197	1738
R-squared	0.327	0.370	0.470	0.327	0.327	0.271	0.330	0.34	0.33

Notes: Coefficients are CARs weighted by firm value. "Competitors" are the first ten firms listed by Google Finance for each sponsor firm; see Table A1. "All firms," "Primary" and "Tiger Brand" include competitors of each group. "Endorsement intensive" firms are those for which a Google search of "[company name] endorsement deals" yields one or more hits describing an endorsement deal during the event window. "Difference" columns show differences between endorsement-intensive and non-intensive competitors. Event date is November 27, 2009. Estimation window begins three months before event date, and ends one week before event date. Standard errors are adjusted for contemporaneous correlation across firms. Numbers in parentheses are standard errors. Asterisks indicate significance at 10% (*), 5%(**) and 1%(***) or better.

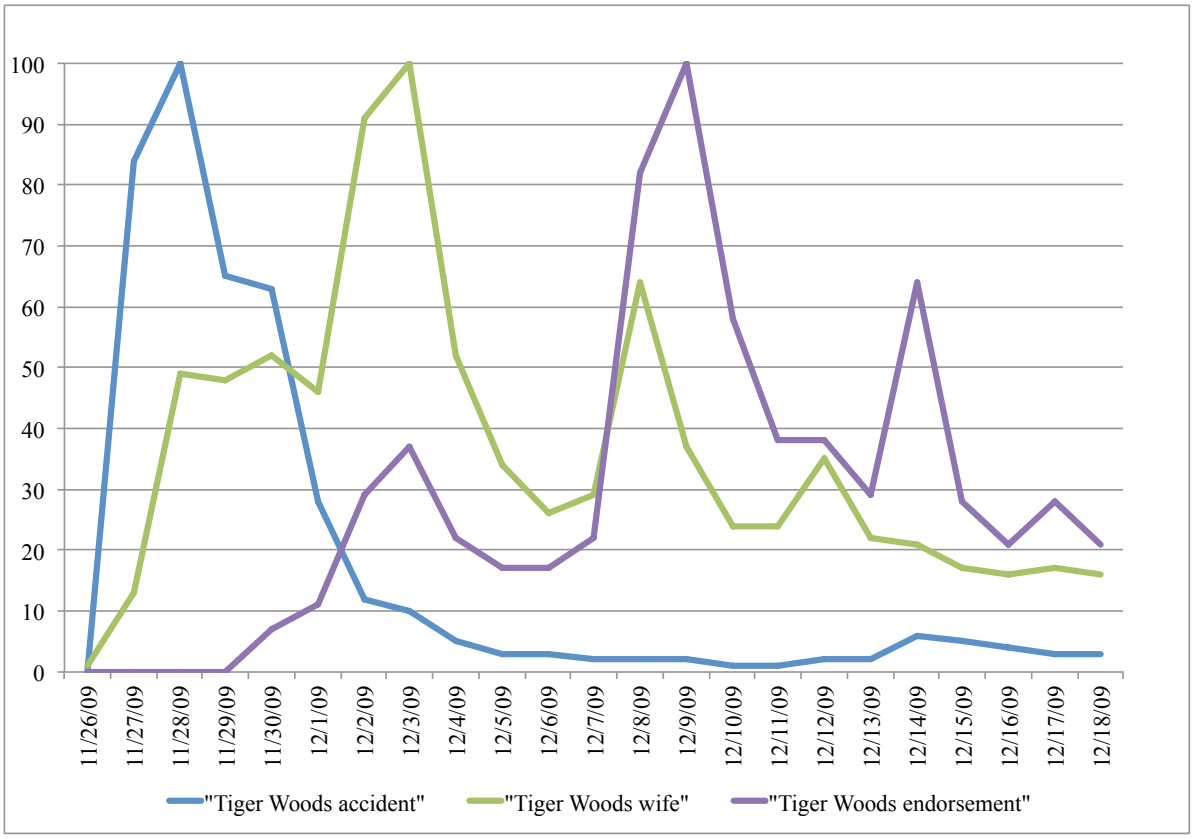
Table 7: Competitors' Abnormal Returns and News/Search Intensity

Dependent variable: Competitors' daily abnormal return			
	All Firms	Primary	Tiger Brand
"Tiger Woods endorsement" search intensity	**0.010*** **	**0.006** **	**0.007** **
	(0.002)	**(0.002)**	**(0.002)**
"Tiger Woods endorsement" search intensity x Endorsement-intensive competitor	**-0.009*** **	**-0.007*** **	**-0.006** **
	(0.002)	**(0.002)**	**(0.002)**
Constant	0.001	**0.002*** **	-0.001
	(0.001)	**(0.001)**	(0.001)
R-squared	0.049	0.028	0.027
"Tiger Woods endorsement" search intensity>25	**0.006*** **	**0.006*** **	**0.005*** **
	(0.001)	**(0.001)**	**(0.001)**
"Tiger Woods endorsement" search intensity>25 x Endorsement-intensive competitor	**-0.006*** **	**-0.006*** **	**-0.005*** **
	(0.001)	**(0.001)**	**(0.001)**
Constant	0.001	**0.002***	**-0.002***
	(0.001)	**(0.001)**	**(0.001)**
R-squared	0.068	0.073	0.055
Endorsement-related news day	**0.004*** **	**0.003***	0.001
	(0.001)	**(0.001)**	(0.002)
Endorsement-related news day x Endorsement-intensive competitor	**-0.005** **	**-0.004***	**-0.004***
	(0.002)	**(0.002)**	**(0.002)**
Constant	**0.003*** **	**0.003*** **	-0.000
	(0.000)	**(0.000)**	(0.001)
R-squared	0.019	0.011	0.015
Observations	775	589	347

Notes: Coefficients are from model of the relationship between competitors' firm-level daily abnormal returns during the period [November 30, December 18] and three different measures of endorsement-related news intensity. Interaction terms test for differential responses across endorsement-intensive and non-intensive competitors (see Table A1). First set of rows use the level of "Tiger Woods endorsement" search intensity (on a [0, 1] scale) to measure endorsement-related news. Second set of rows use an indicator equal to one if "Tiger Woods endorsement" intensity exceeds 0.25, and zero otherwise. Third set of rows use indicator variables equal to one on December 3, December 9, December 11 and December 14; see Table 1 for details. Numbers in parentheses are standard errors. Asterisks indicate significance at 10% (*), 5%(**) and 1%(***).

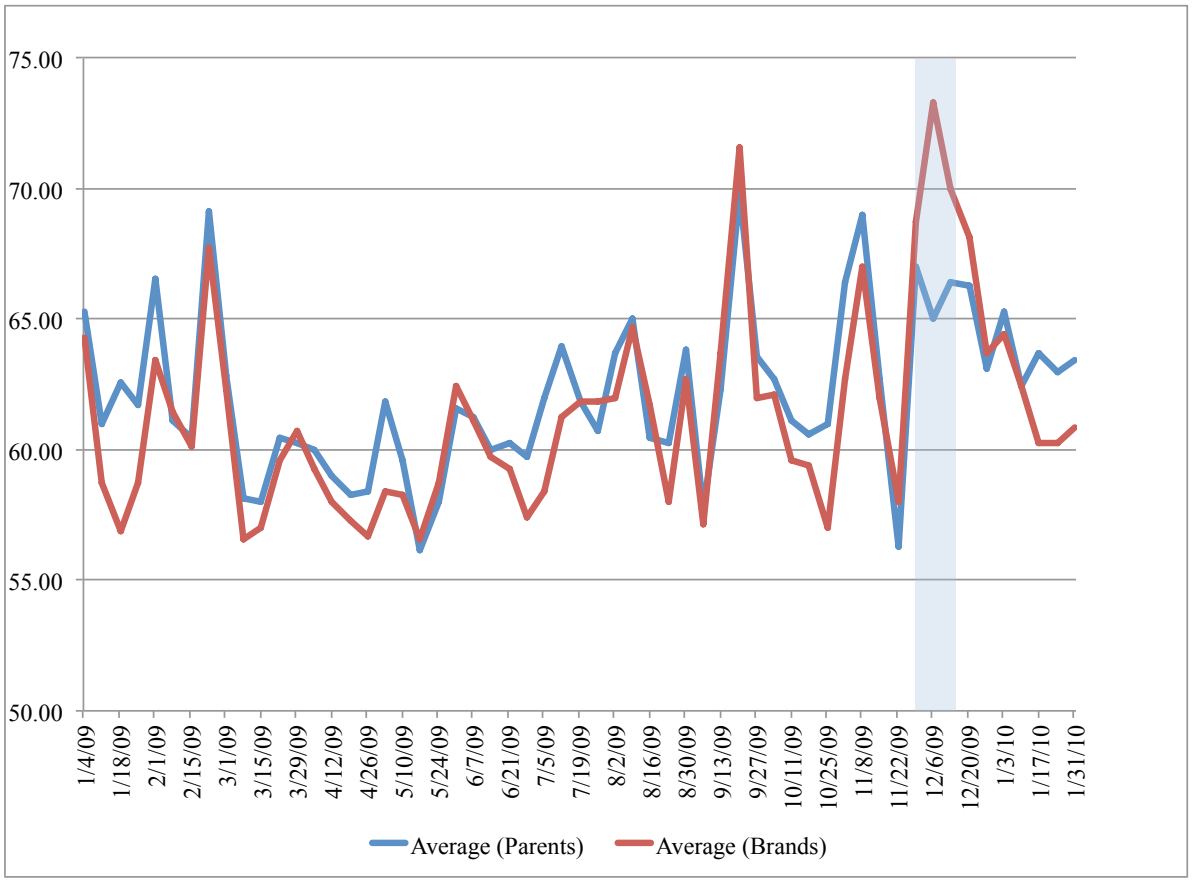
7 Figures

Figure 1: Post-Accident Search Intensity Related to Tiger Woods



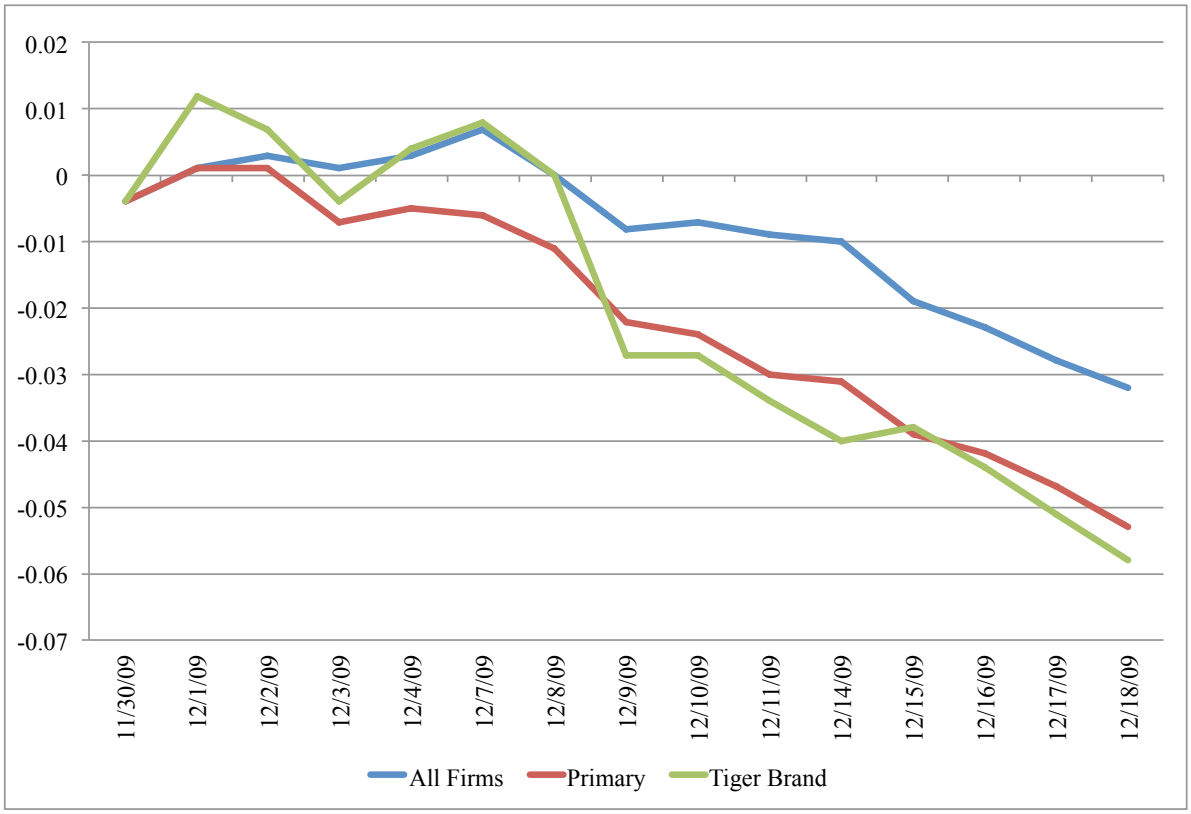
Notes: Search intensity is from http://www.google.com/insights/search/. Search intensity is normalized within each term, with peak volume at 100 and lower numbers representing percentage of peak volume. "Tiger Woods accident" and "Tiger Woods wife" are the top-ranked searches listed by Google insights following an initial search for "Tiger Woods."

Figure 2: Average Search Intensity for Sponsor Firms, Jan. 2009 to Jan. 2010



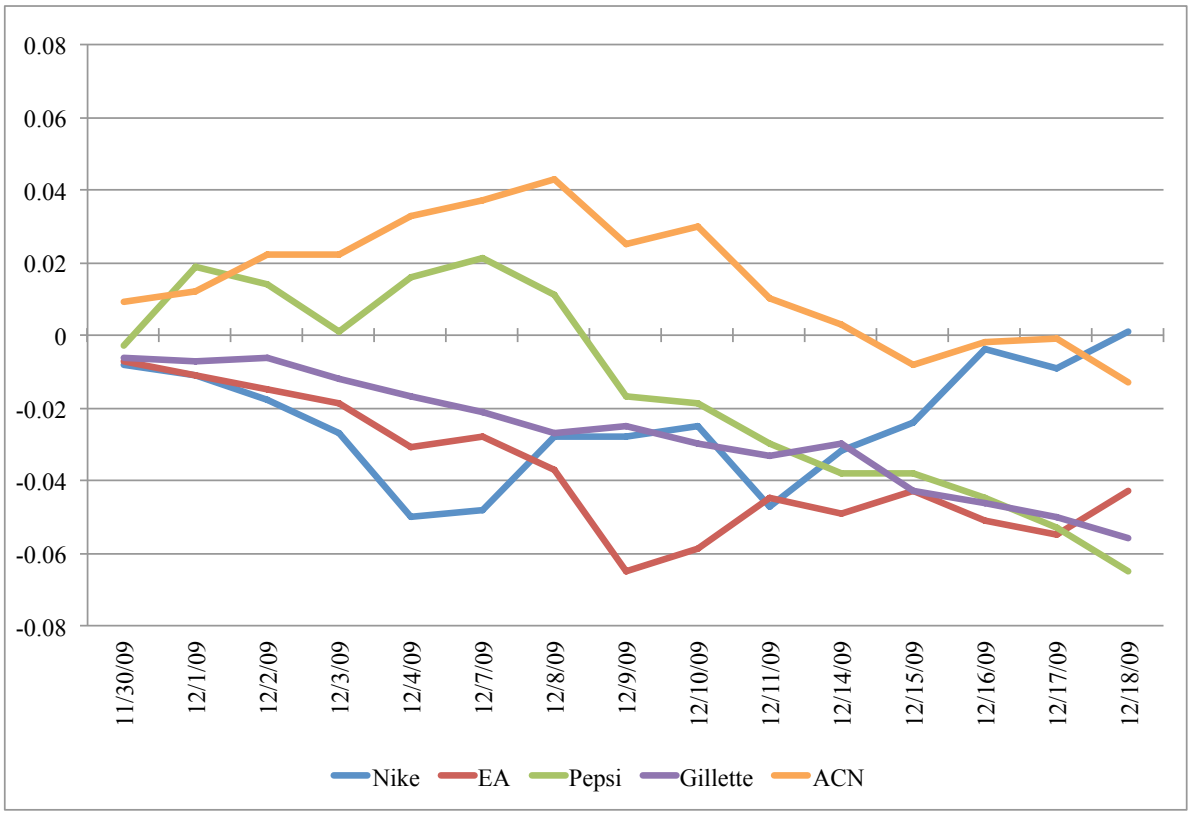
Notes: Search intensity is from http://www.google.com/insights/search/. Figure plots unweighted averages of search intensity for the seven sponsor brand/parent firms listed in Table 1.

Figure 3: Cumulative Abnormal Returns for Sponsor Firm Groups



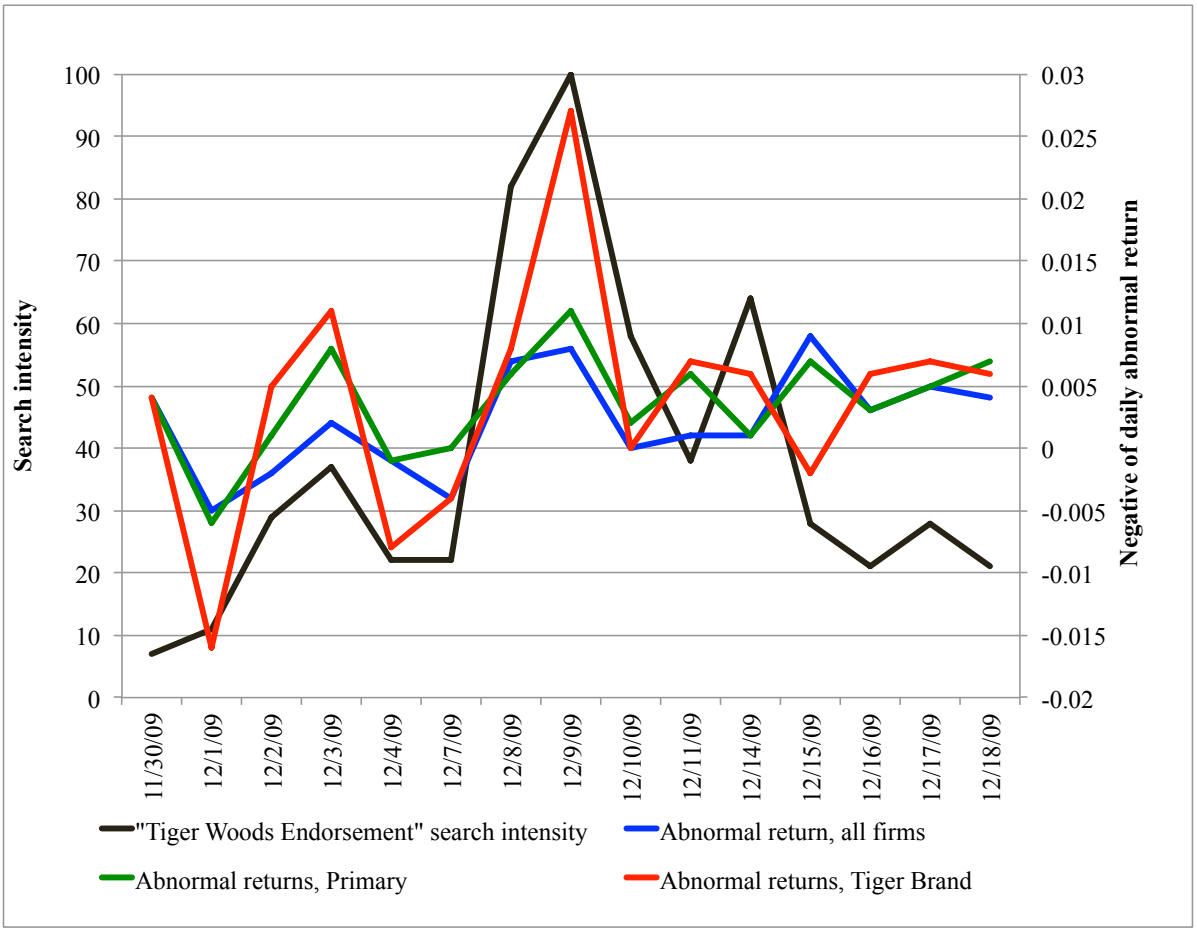
Notes: Cumulative abnormal returns (CARs) are from Table 3.

Figure 4: Cumulative Abnormal Returns for Individual Sponsor Firms



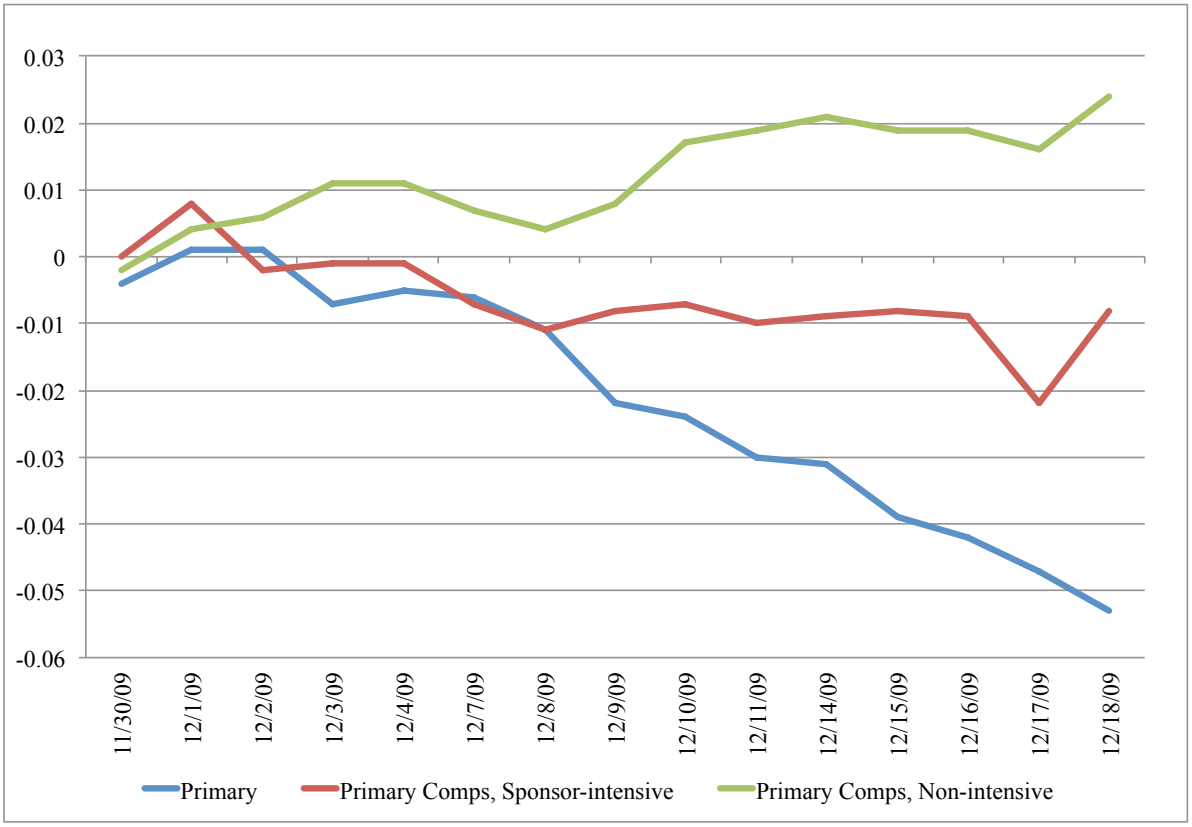
Notes: Cumulative abnormal returns (CARs) are from sponsor-by-sponsor event studies based on specification in equation 1.

Figure 5: "Tiger Woods endorsement" Search Intensity and Daily Abnormal Returns



Notes: Search intensity is from http://www.google.com/insights/search/, as in Table 2. Abnormal returns are plotted as the negative of coefficients from Table 4.

Figure 6: Sponsors' and Competitors' Cumulative Abnormal Returns



Notes: Coefficients are cumulative abnormal returns from Tables 3 and 6.

A Appendix

Table A.1: Sponsors, competitors and "endorsement intensity"

PROCTER & GAMBLE CO	NIKE INC	PEPSICO INC
Church & Dwight Co., Inc.	Deckers Outdoor Corp.	**The Coca-Cola Company**
The Clorox Company	Crocs, Inc.	Coca-Cola Enterprises (bottler)
Colgate-Palmolive Company	**Skechers USA, Inc.**	Hansen Natural Corporation
Johnson & Johnson	**K-Swiss Inc.**	Jones Soda Co. (USA)
CCA Industries, Inc.	Steven Madden, Ltd.	Cott Corporation (USA)
Kimberly-Clark Corporation	Heelys, Inc.	**Dr Pepper Snapple Group**
Energizer Holdings, Inc.	LaCrosse Footwear, Inc.	National Beverage Corp.
Zep, Inc.	*The Global Housing Group*	Reed's, Inc.
PC Group, Inc.	*adidas AG (ADR)*	*Celsius Holdings, Inc.*
The Stephan Co.	*Puma AG Rudolf Dassler*	*Fomento Economico Mexi*

T L C VISION CORP	ACCENTURE LTD BERMUDA	ELECTRONIC ARTS INC
LCA-Vision Inc.	**Microsoft Corporation**	THQ Inc.
Hanger Orthopedic Grou	**Hewlett-Packard Company**	**Microsoft Corporation**
U.S. Physical Therapy,	Intl. Business Machine	**Activision Blizzard, Inc.**
NovaMed, Inc.	Genpact Limited	**Take-Two Interactive Software**
UCI Medical Affiliates	Oracle Corporation	The Walt Disney Company
Pacific Health Care Or	Infosys Tech. Ltd. (ADR)	KONAMI CORPORATION (ADR)
Clinica de Marly S.A.	Hewitt Associates, Inc.	Sony Corporation (ADR)
SHL TeleMedicine Ltd.	Dell Inc.	Majesco Entertainment Co.
Feelgood Svenska AB	Towers Watson & Co	Time Warner Inc.
European Lifecare Grou	*Accenture Plc (Germany)*	*Nintendo Co., Ltd (ADR)*

A T & T INC
Verizon Communications
Sprint Nextel Corporation
Qwest Communications I
CenturyTel, Inc.
Apple Inc.
General Communication,
Cbeyond, Inc.
Cincinnati Bell Inc.
Intl. Business Machine
Deutsche Telekom AG (ADR)

Notes: Each underlined heading is for one of the sponsors listed in Table 1. Next ten rows under each heading show the first ten firms listed, in order, by Google Finance under "competitors." Competitors are measured relative to the parent company. Bold competitors are those classified as "endorsement-intensive," meaning that a Google search for the company name followed by "endorsement deals" yields at least one mention of a celebrity endorsement contract. Competitor names in italics are not listed on U.S. stock exchanges.

Table A.2: Abnormal Returns and Alternative Measures of Search Intensity

Dependent variable: Sponsors' daily abnormal return			
	All Firms	Primary	Tiger Brand
"Tiger Woods endorsement" search intensity	**-0.008***	-0.007	**-0.026*****
	(0.003)	(0.004)	**(0.006)**
"Tiger Woods accident" search intensity	-0.003	0.000	-0.007
	(0.006)	(0.007)	(0.010)
Constant	0.001	-0.001	**0.007***
	(0.002)	(0.002)	**(0.003)**
R-squared	0.050	0.056	0.314
"Tiger Woods accident" search intensity	0.003	0.006	0.012
	(0.005)	(0.006)	(0.011)
Constant	**-0.002***	**-0.004*****	**-0.005***
	(0.001)	**(0.001)**	**(0.002)**
R-squared	0.003	0.012	0.029
"Tiger Woods endorsement" search intensity	**-0.007***	**-0.007***	**-0.024*****
	(0.003)	**(0.004)**	**(0.006)**
"Tiger Woods wife" search intensity	0.004	0.001	-0.002
	(0.003)	(0.004)	(0.006)
Constant	-0.001	-0.001	0.006
	(0.002)	(0.002)	(0.003)
R-squared	0.062	0.057	0.308
"Tiger Woods wife" search intensity	0.003	0.001	-0.002
	(0.003)	(0.004)	(0.007)
Constant	**-0.003***	**-0.004***	-0.003
	(0.001)	**(0.002)**	(0.003)
R-squared	0.013	0.001	0.003
Observations	105	75	45

Notes: Coefficients are from model (3) in text, modeling the relationship between firm-level daily abnormal returns during the period [November 30, December 18] and alternative measures of endorsement-related news intensity. Measures are the level of "Tiger Woods accident," "Tiger Woods wife" and "Tiger Woods endorsement" search intensity on a [0, 1] scale from Figure 1. Numbers in parentheses are standard errors. Asterisks indicate significance at 10% (*), 5%(**) and 1%(***) or better.