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Do stock prices undervalue investments in advertising?
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Abstract:	Under the efficient market hypothesis, the stock price incorporates the full value of a firm's advertising. If so, advertising spending should not be associated with future abnormal stock returns. Nevertheless, from 1995 to 2015, advertising spending often leads to abnormal stock returns the following year. The strongest results surface for consumer goods and services where advertising used to build brand equity can carryover from one year to the next. No significant differences arise for healthcare, industrial goods, or retailer advertising. Healthcare and industrial goods advertising is often modest. Retailer advertising that builds traffic should have little if any carryover into the following year. These results may help marketing managers defend an advertising budget whose benefits carryover into the following year, but hurt current profits. Having more investment analysts on Wall Street with a marketing background should help reduce this overly conservative "wait and see" discount for carryover advertising.
Additional Information:	

Question	Response
What is your manuscript's word count (including references)?	4977 words

Response to Reviewer 1

Thank you again for your feedback. We appreciate the time you have taken to read the revision and to hear that we solved all of the issues you raised in the first round of reviews.

Response to Reviewer 2

Thank you again for your feedback. We appreciate the time you have taken to read the revision and your positive feedback on the revised data analysis. Your final comment on profitability and advertising spending is addressed below.

1) Do the high versus low advertising portfolios in Tables 3a and 3b differ with respect to earnings/profitability? If so, please show that it is not the earnings difference that is driving the results.

This is an excellent question that addresses the underlying mechanism in the original findings. Two traditional measures are used to estimate profitability differences for the high versus low advertising portfolios. The measures are earnings before interest and taxes divided by total assets (EBIT) and earnings before interest, taxes, depreciation, and amortization also divided by total assets (EBITDA).

For Table 3a, the difference between profitability for high versus low advertising intensity firms is not statistically significant. For Table 3b, the difference for advertising change is statistically significant, but it is negative instead of positive. (Firms with high advertising change have lower profitability compared to the firms with low advertising change.) Thus, increased advertising does not appear to be a proxy for highly profitable firms that can easily boost their advertising budgets.

Instead, these results indicate that increased advertising often reduces short-term profits. This is consistent with carryover advertising reducing short-term profits (EBIT and EBITDA), with the goal of increasing future sales and profits. This material is now included in the Alternative Explanations section.

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Abstract Under the efficient market hypothesis, the stock price incorporates the full value of a firm's advertising. If so, advertising spending should not be associated with future abnormal stock returns. Nevertheless, from 1995 to 2015, advertising spending often leads to abnormal stock returns the following year. The strongest results surface for consumer goods and services where advertising used to build brand equity can carryover from one year to the next. No significant differences arise for healthcare, industrial goods, or retailer advertising. Healthcare and industrial goods advertising is often modest. Retailer advertising that builds traffic should have little if any carryover into the following year. These results may help marketing managers defend an advertising budget whose benefits carryover into the following year, but hurt current profits. Having more investment analysts on Wall Street with a marketing background should help reduce this overly conservative "wait and see" discount for carryover advertising.

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Do stock prices undervalue investments in advertising?

1 Introduction

Addressing the financial consequences of advertising spending is an important task for marketing managers. This is especially true for spending that is designed to have long-term benefits. These benefits, for example, can arise from advertising new products or from advertising which builds brand equity.

However, advertising spending is easily exposed to budget cuts to boost a firm's short term earnings. For instance, in the great recession, U.S. advertising spending fell 14% in the first quarter of 2009 (*Wall Street Journal* 2009). While cost cuts are often unavoidable in a recession, deep spending cuts can lead to a significant loss of market share during the market recovery.

A number of studies in the marketing literature address various types of stock market reactions associated with advertising spending. Some recent examples examine the importance of advertising when launching a pioneering innovation (Srinivasan et al. 2009), spending during recessions (Srinivasan, Lilien, and Sridhar 2011), and reactions to unexpected growth in advertising expenditures (Kim and McAlister 2011). Finally, in the personal computer and sporting goods industries, Joshi and Hanssens (2010) report that advertising spending can increase a firm's stock market valuation months after the spending has occurred.

While the aforementioned studies examine important aspects of advertising, there could be a general tendency for stock prices to under-estimate the value of advertising spending. This can arise when intangible assets created by advertising, such as brand equity, are not fully valued by investors. Empirically, Chan, Lakonishok, and Sougiannis (2001) report some "exploratory" results. From 1975 to 1995, stock market data indicates that advertising spending is typically under-valued. For example, firms in the highest advertising quintile have an average risk-adjusted excess return of 3.10 percent per year (p. 2451).

Our study builds on Chan, Lakonishok, and Sougiannis (2001) in two important ways. First, we examine if the empirical results from 1975 to 1995 also hold in a sample of firms that span 1995 to 2015. These results provide more contemporary insights into whether or not the stock market efficiently values the intangible nature of advertising. On the one hand, because information has become cheaper, easier, and faster to access, investors have a better opportunity to fully value an advertising campaign. On the other hand, advertising campaigns have become more

fragmented over time, which makes it more difficult to track and value. For example, many advertising budgets have evolved into fragmented campaigns that span network television, cable television, print, internet, and mobile advertising. Thus, whether or not stock prices fully value advertising campaigns is an empirical issue.

Second, because some advertising has a short-term impact while other advertising has a large carryover impact into the following year, important differences can arise across industries. For example, advertising to strengthen brand equity is especially important for consumer goods and services. Because brand equity is difficult to measure and its impact often helps sales and profits in the following year, stock prices may undervalue current spending.

The empirical results below indicate that investments in advertising relative to industry norms tend to be undervalued by the stock market. Because significant risk-adjusted returns surface from 1995 to 2015, it appears that stock prices typically undervalue the intangible benefits associated with advertising spending.

Important industry differences also surface. As expected, the results are strongest for consumer goods and services, where advertising is often used to build brand equity. No meaningful impact surfaces for healthcare, industrial goods, or retailer advertising. Healthcare and industrial goods advertising spending is often modest. Retailer advertising that builds traffic should have little if any carryover into the following year. .

Managerial implications arise from Jacobson and Mizik's (2009, p. 811) observation that, "A central contribution of anomalies research is that it can help improve the efficiency of capital markets and managerial actions." Because it appears that stock prices often undervalue carryover advertising, recognition of this anomaly can lead to greater efficiency in stock pricing as well as fewer advertising budget cuts when short-term profits are under pressure.

2 Theory and hypotheses

In COMPUSTAT, advertising includes the annual cost of advertising media such as television, radio, and periodicals, plus promotional spending. Because promotional spending often has a short-term impact on sales and profits, the hypotheses highlight advertising spending. Following Mizik and Jacobson (2007), advertising intensity equals advertising expense divided by total assets. Annual advertising intensity change, therefore, equals the difference in advertising intensity in year t and year t - 1.

While the stock market is very efficient at setting share prices, research on market anomalies examines numerous reasons why there are pockets of inefficiencies in stock prices. Numerous books and journal articles have been written summarizing academic insights on where market anomalies are most likely to arise. Two examples are The Handbook of Equity Market Anomalies (2011) by Zacks and Beyond the Random Walk (2006) by Singal. Our study attempts to contribute to this literature by examining the difficulty that investors have in valuing advertising that builds brand equity.

In the United States, generally accepted accounting principles (GAAP) require a firm to expense all of the advertising spending in financial reports and to ignore any intangible assets created by advertising. Because of these accounting guidelines, even a successful advertising campaign can decrease current earnings. This occurs when intangible assets created by advertising increase future sales and profits, which more than offset the current profit decline. Even so, because the stock market is forward looking, the efficient market hypothesis predicts that stock prices fully reflect the value of advertising's intangible assets. With an efficient stock market, there are no excess returns for investing in firms with intensive advertising and then waiting for investors to eventually recognize its value.

If the stock market undervalues investments in advertising, Eberhart, Maxwell, and Siddique (2004), Kim and McAlister (2011), and others conclude it is more likely to undervalue changes in advertising. This is because advertising at a constant level over time does not provide any new information to investors. With an efficient market, new information influences stock prices. Because a change in advertising spending reflects new information, it may or may not be fully incorporated in stock prices.

In contrast, Jacobson and Mizik (2009b, p. 837) argue that mispricing can be based on changes, levels, or a combination of both. As mentioned above, Chan, Lakonishok, and Sougiannis (2001) report an excess risk-adjusted return of 3.10% per year for firms that advertise in the highest quintile. This may arise because even with a constant budget, spending priorities can change over time. For example, one year the advertising budget can be largely spent on a new product launch and the next on brand building. Thus, our measure of advertising spending considers both advertising intensity and changes in advertising intensity.

Advertising and Future Stock Returns

There are at least two reasons why it is difficult for investors to estimate the intangible asset values created by advertising. First, there is a great deal of uncertainty about the short-term effectiveness of an advertising campaign.

Sethuraman, Tellis, and Briesch's (2011) meta-analysis reports that only 57% of the advertising sales elasticities are significantly different from zero. With many advertising campaigns not having a measurable impact on sales and even fewer having a measurable impact on profits, it is difficult for a seasoned marketing manager to evaluate campaign effectiveness. It is even more difficult for an investor who has limited access to advertising budget and testing data.

Second, even when advertising works in the short-term, the duration of the impact on sales and profits is controversial. Based on numerous econometric studies, Leone's (2009) empirical generalization concludes the average duration on sales is typically between six and nine months.

In contrast, Lodish et al. (1995) analyze 55 split-cable TV markets. In a split-cable market, a control group of cable TV viewers sees one advertising campaign and an experimental group sees a different campaign. These in-market experiments estimate that when advertising increases sales in the first year, the sales impact roughly doubles the following two years.

Given this research controversy, should an investor assume an advertising campaign only has a six to nine-month duration or the potential to last for three years? While it is beyond the scope of our paper to resolve this controversy, at least some advertising campaigns should have a strong carryover impact on sales and profits. One key reason is because advertising can strengthen brand equity. Kotler and Keller (2006, p. 276) define brand equity as, "the added value empowered to products and services…. Brand equity is an important intangible asset that has psychological and financial value to the firm."

Additional empirical evidence supports the long-term impact of advertising on brand equity. Jeddi, Mela, and Gupta (1999) conclude that advertising has a long-term impact on brand equity. Advertising tends to increase consumer choice for the advertised brand as well as increase the amount purchased.

In summary, because it is difficult to estimate the impact of current year advertising spending on brand equity, this intangible asset can be undervalued. Over time, as these intangible assets increase sales and profits, investors will take notice and bid share prices up. When investors under-value current year advertising spending, forward-looking investors can earn excess returns. This can explain why Chan, Lakonishok, and Sougiannis (2001) report above average returns for advertising spenders in their sample that spans 1975 to 1995.

Are similar results expected from 1995 to 2015 or has the stock market learned how to fully value investments in advertising? On the one hand, information access has become faster, cheaper, and more detailed over the years. This should help investors estimate the current as well as the future value of an advertising campaign. Yet, it is still

difficult to value the intangible assets associated with a brand building campaign. Also, advertising spending has become much more fragmented over time. Fragmented spending arises from hundreds of cable TV channels, thousands of specialty magazines, internet advertising, and mobile advertising directed at smart phones and tablets. In contrast, until the late 1980s or early 1990s, the mass market could be reached by advertising on three major television networks (ABC, CBS, and NBC) and in a few leading magazines.

While it is difficult to value a concentrated campaign, it is even more difficult for investors to value a fragmented campaign. This seems especially true for firms that invest in advertising that has an important carryover effect in the following year. Overall, given the numerous challenges in valuing the carryover impact of fragmented advertising campaigns, it seems likely that many advertising campaigns are not fully valued by the stock market.

While finance studies on R&D spending examine stock returns three years after the current year spending (Chan et al. 2001 and Eberhart, Maxwell, and Siddique 2004), any intangible assets created by advertising should not take three years for investors to notice. This is because advertising carryover should increase sales and profits in the following year. Joshi and Hanssens (2010), for example, report that advertising for sporting goods and personal computers can take six to eight months to be realized in their share prices. Thus, the advertising hypotheses highlight abnormal returns over the following twelve months.

As mentioned above, our advertising spending measure combines advertising intensity and changes in advertising intensity. Because there are important differences in advertising spending across industries, both measures are estimated relative to the industry median. This yields:

H$_1$: From 1995 through 2015, advertising spending leads to higher abnormal returns in the following twelve months.

Advertising Differences across Industries

Are abnormal returns to advertising the same across all industries? The data below cover 1) consumer goods, 2) consumer services, 3) healthcare, 4) industrial goods, and 5) retailers. Advertising is often important for consumer goods and services, which provides a low cost way to reach millions of potential customers. As mentioned above, advertising can help build brand equity. It can also help "pull" a product through the distribution channels, which

strengthens shelf-space and shelf-position. Overall, consumer goods and services seem to have the greatest potential to undervalue the intangible assets created by advertising.

For healthcare, advertising is typically less important than other forces such as sampling, physician referrals, in-network coverage, and word-of-mouth. While some advertising such as direct-to-consumer ads can strengthen brand equity, it is probably not as important as advertising for consumer goods and services.

For industrial goods, personal selling is often required to initiate and close a sale. As Kotler and Keller (2006, p. 616) indicate, "Today most industrial companies rely heavily on a professional sales force to locate prospects, develop them into customers, and grow the business." With sophisticated buyers and budgets that emphasize personal selling, advertising often plays a minor role in the sales process.

For retailers, the primary goal of many advertising campaigns is to build traffic. Retailers try to build traffic with loss leaders, hoping that consumers will buy some higher margin products during their visit. Another retail advertising goal is to clear out inventory at the end of a season. Building traffic and clearing out inventory should yield short-term results, with a limited impact on year-ahead sales and profits. If so, retail advertising has limited carryover in the following year. This yields:

H_2:   From 1995 through 2015, advertising spending has higher abnormal returns in the following twelve months for consumer goods and consumer services versus healthcare, industrial goods, and retailers.

3 Data

Our sample starts with all non-utility and non-financial firms[1] in the (a) the NYSE, AMEX, and NASDAQ monthly stock return files from the Center for Research in Security Prices (CRSP) and the merged COMPUSTAT annual data from 1995 to 2015. Because of their unique characteristics, the sample excludes real estate investment trusts, closed-end funds, and non-US firms like Alibaba that trade in the United States.

We start our analysis in 1995. This updates the results from Chan, Lakonishok, and Sougiannis (2001) that span 1975 to 1995. It is important to note that our sample excludes firms that do not report advertising spending. The

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[1] Prior studies in the finance and accounting literature often exclude regulated utility firms (SIC 4900-4999) and financial institution (SIC 6000-6999). Financial firms are excluded because their high leverage does not have the same meaning as for nonfinancial firms, where high leverage often indicates distress.

disclosure of advertising spending, which had been required, became voluntary in June 1994 (Simpson 2008). Thus, all of our sample firms voluntarily reported their advertising spending.

Because only 60% of our sample voluntarily reports advertising spending, does an important sampling bias arise by excluding the remaining 40%? Recall the efficient market hypothesis predicts that all available information is included in a stock's price. Because firms reporting their advertising provide more information to shareholders, their stock prices should be more efficiently priced. If so, abnormal returns may be higher for the excluded firms that do not report their advertising spending. This is because it should be even more difficult for investors to identify the intangible assets created by their advertising.

To ensure the accounting variables (e.g., advertising expense) are known before stock returns are calculated, and to capture the impact of advertising spending in a timely manner, the accounting data for the fiscal year covered by the accounting statements announced in month m of year t (using the report date of quarterly earnings variable in Compustat's Quarterly data) is matched with the monthly stock returns for months $m+1$ of year t to month m of year $t+1$. For example, in the data analysis below, stock returns from April 2003 to March 2004 are matched with the accounting information released in March 2003.

Advertising expense includes the cost of advertising media such as television, radio, periodicals, and promotional expenses. For firm i in year t, advertising intensity equals advertising expense divided by total assets.

$$Adint_{i,t} = \frac{Advertising\ Expense_{i,t}}{Total\ Asset_{i,t}}$$

(1)

Because advertising is a key strategic investment, the level and change are estimated versus industry medians. This is because each industry requires a different level of advertising intensity for firms to remain competitive. Coca-Cola, for example, needs to spend more on advertising than Intel. Therefore, we treat the level of advertising intensity as high (low) when a firm's industry-adjusted advertising intensity (in excess of the median advertising intensity in firm's industry) places it in the top (bottom) 30th percentile of the industry-adjusted advertising intensity distribution in a given year. Firms with advertising intensity in the middle 40 percent of the distribution are classified as medium advertising intensity firms. Similarly, the change in advertising intensity (i.e., $Adint_{i,t} - Adint_{i,t-1}$) is compared to the industry's median change in each year.

In bivariate sorts, based on the level and change in advertising intensity within its industry, a firm is classified into one of three portfolios.

- High Advertising Portfolio: Firms in the top 30th percentile of both advertising intensity and change in advertising intensity within their industries.

- Low Advertising Portfolio: Firms in the bottom 30th percentile of both advertising intensity and change in advertising intensity within their industries.

- Mixed Advertising Portfolio: Mixed signals in terms of advertising intensity and change. The portfolio includes all the firms that are in neither the High Advertising Portfolio nor Low Advertising Portfolio as defined above.

Across the entire sample, the High Advertising Portfolio has an average advertising intensity of 7.5% of assets and a 1.9% increase in advertising intensity. The Mixed Advertising Portfolio has an average advertising intensity of 4.1% of assets and a .9% decrease in advertising intensity. The Low Advertising Portfolio has an average advertising intensity of 1.1% of assets and a .6% decrease in advertising intensity.

Note, there is more variation across the portfolios for advertising intensity compared to the change in advertising intensity. This may arise because the majority of firms are mature, with few major changes in their advertising budgets.

Table 1 reports descriptive statistics across 28 different industries. These industries exclude the utility and financial sectors from the Fama-French Industry 30 classification code.[2] To have enough firms for the industry median adjustment, industries with fewer than five firms per year are merged into a similar industry with the same first digit of their SIC code and similar advertising intensity. For example, Tobacco is merged with the Beer and Liquor industry. To test H_2, these industry groups are combined into Consumer Goods, Consumer Services, Healthcare, Industrial Goods, and Retailers.[3]

4 Empirical Analysis

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[2] http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/Data_Library/det_30_ind_port.html

[3] While some firms in the services group provide business services, the majority provide consumer services.

In marketing, the most popular approach to identify long-run abnormal returns is a calendar-time portfolio analysis. Calendar-time portfolio analysis combines many different firms in distinct portfolios. Combining many different firms in a single portfolio helps diversify away firm-specific risks. See, for example, Sorescu, Shankar, and Kushwaha (2007), Jacobson and Mizik (2009), and Chen, Chiang, and Yang (2014).

The calendar-time portfolio analysis below simulates a zero-cost investment strategy by estimating abnormal returns for a long-short portfolio. The zero-cost investment strategy arises by buying (taking a long position in) a portfolio of stocks that highlight a potential market anomaly and selling (taking a short position in) a portfolio of similar stocks that should not benefit from the anomaly.

At the end of each month, t of year y, over June 1996-November 2015, stocks that reported annual earnings during the previous year (for example, for the June 1996 portfolio formation, stocks that announced during July 1995 - June 1996 are used) are sorted into three groups (High Advertising Portfolio, Medium Advertising Portfolio, and Low Advertising Portfolio) based on advertising intensity and change in advertising intensity. Portfolios are updated every month and returns in the following month are calculated using value-weighting. Once a stock is allocated to a portfolio, it stays there for twelve months. By doing so, a time-series of monthly returns from July 1996 to December 2015 is constructed for each portfolio.

In equation (2), Carhart's (1997) four-factor model adjusts each portfolio for various types of risk. Table 2 defines the key variables and describes the data sources.

$$R_{pt} - R_{risk\ free,t} = \alpha_p + \beta_p(R_{mkt,t} - R_{risk\ free,t}) + s_p SMB_t + h_p HML_t + m_p UMD_t + \varepsilon_{pt} \qquad (2)$$

R_{pt} is the monthly return for portfolio p in month t; $R_{risk\ free,\ t}$ is the one-month Treasury bill rate in month t; SMB is the size factor return, the return differential between portfolios of small and large market capitalization stocks, in month t; HML is the book-to-market factor return, the return differential between portfolios of stocks with high and low book-to-market ratios, in month t;[4] UMD is the momentum factor return, the return differential between portfolios of past winners and losers, in month t. The intercept α_p is the monthly abnormal return on portfolio p relative to the four factor model. Under the efficient market hypothesis, there are no abnormal returns, so α_p should equal zero.

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[4] See Fama and French (1993) for a complete description of the SMB and HML factor returns.

Table 3 reports the first set of results. The results show value-weighted abnormal stock returns for the long and short portfolios. Portfolio High (Low) denotes the firms with greater (lower) industry-adjusted advertising spending. The abnormal monthly return for advertising intensity alone is .31% (Panel A, Column 2). This result is based on purchasing stocks in the Portfolio High group and shorting those in the Portfolio Low group. For advertising intensity change alone, the abnormal monthly return is .14% (Panel B). H_1 is tested using the results in Panel C, which uses the combined measure. The average abnormal monthly return is .21%, which is statistically significant (t=2.05). A conservative estimate assumes the monthly returns are not compounded. This yields a twelve-month abnormal return of 12 times .21% or 2.52%.

While Table 3 provides insights into abnormal returns across the entire sample, there are important differences across industries. Because advertising is especially important for consumer goods and services, H_2 predicts these industries should have the highest abnormal returns.

In Table 4, H_2 is supported in the sense that average abnormal monthly returns for consumer goods are .76% and .79% for consumer services. With conservative two-tailed tests, both results are statistically significant at the 5% level, with a twelve-month abnormal return of roughly 9%. Because advertising for consumer goods and services is often designed to increase brand equity, these results point to an important carryover effect in the following year.

In Table 4, the results for healthcare, industrial goods, and retailer advertising are not significant. These nonresults may arise because healthcare and industrial goods advertising is often modest. Retailer advertising, which builds traffic in the current week or month, should have a short-term impact on sales and profits. With limited carryover into the following year, this nonresult is also reasonable.

5   Alternative Explanations

Because many advertising campaigns do not work, it is possible that intensive advertising and increased advertising spending increase risk, which is not measured in the risk adjusted returns. If so, the abnormal returns reported above may simply reflect riskier investments and not a true risk-adjusted return. Table 4's industry specific results though are more consistent with the stock market not fully valuing brand equity advertising for consumer goods and services. This is because advertising campaigns can fail across a broad range of industries. Failed campaigns are not limited to consumer goods and services.

A second alternative explanation is that time-varying risk may not be accurately estimated in a calendar time portfolio setting. For example, see Jacobson and Mizik (2009). A rolling window approach helps address this problem by using a four factor model recursively with a rolling window of twelve months and a one-year step. The resulting coefficient estimates are time-series averages of annual regression coefficients, with the standard errors adjusted for autocorrelation. Empirically, the hypothesis testing results are not materially influenced by this alternative model estimation.

A third alternative explanation is that higher profitability boosts advertising spending. If so, higher profitability may be driving the abnormal returns reported above. Two traditional profitability measures are earnings before interest and taxes divided by total assets (EBIT) and earnings before interest, taxes, depreciation, and amortization also divided by total assets (EBITDA).

In Table 3a, the profitability differences between high and low advertising intensity firms is not statistically significant. In Table 3b, the difference for advertising change is statistically significant, but is negative instead of positive. These results are consistent with carryover advertising reducing short-term profits (EBIT and EBITDA), with the goal of increasing future sales and profits.

6 Discussion

The efficient market hypothesis predicts that stock prices reflect the true value of the firm and any deviation from the stock price is random. Even when advertising spending temporarily decreases quarterly earnings, the full value of an advertising campaign should be included in a firm's stock price.

In contrast to the efficient market hypothesis, the empirical results above report that a combined measure of advertising intensity and changes in advertising intensity is positively associated with future abnormal returns. For example, firms with above average advertising intensity and above average changes in advertising intensity versus industry median spending have an abnormal return of almost 3% in the following year.

In addition, important results surface across industries. With abnormal returns of roughly 9% the following year, the strongest evidence of an advertising carryover effect arises for consumer goods and consumer services. This can arise when advertising is designed to increase brand equity, which has an important carryover effect into the following year.

While advertising is important for retailers to build traffic, there is no evidence of a carryover effect the following year. This result is not surprising because advertising to build traffic should have an impact in the following few weeks, but not in the following year. Advertising plays a modest role in selling healthcare products, so no empirical evidence of a carryover effect is also reasonable.

For industrial goods, the monthly abnormal return is positive, but not statistically significant. This may arise because the informative nature of industrial advertising should carry over into the following year. Yet the budget is often modest, which limits the size of the abnormal return.

Conclusions

Do stock prices undervalue investments in advertising? If the advertising is designed to have an immediate impact on sales and profits, like most retail advertising, stock prices should accurately reflect its effectiveness. For advertising which has a carryover impact in the following year, our results indicate the stock market does not fully value these investments. This is especially true for consumer goods and services, whose positive risk-adjusted returns in the following year indicate that many investors "wait to see" if their advertising works. Having greater disclosure of advertising spending and more investment analysts on Wall Street with a marketing background should help reduce this overly conservative "wait and see" discount for carryover advertising.

In addition, for firms where advertising has a carryover effect in the following twelve months, there are important implications for top management and marketing managers. When top management debates whether or not advertising spending should be cut to avoid an "earnings miss," marketing should have an important role in the debate. Whenever possible, marketing should provide evidence of advertising carryover and the future problems associated with cutting advertising to boost short-term profits.

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Table 1 Descriptive statistics across industries

This table reports descriptive statistics of advertising intensity and advertising expense across industry classifications. Twenty three industries are from the Fama-French Industry 30 classification code, which excludes the Financial and Utility industries. For the industry median adjustment, any industry with less than five firms per year is merged into an industry with the same first digit SIC code and similar advertising intensity (e.g. Tobacco products are merged into Beer and Liquor).

Definitions	Average # of Firms	Average of Advertising Intensity	STDEV of Advertising Intensity	Average of Advertising Expense(mil.$)	STDEV of Advertising Expense(mil.$)	Category	Fama-French Industry 30 code
Food Products	52	0.05	0.06	181.07	372.83	Consumer Goods	1
Beer, Liquor and Tobacco Products	18	0.08	0.08	329.42	499.02	Consumer Goods	2,3
Recreation	58	0.05	0.07	48.08	128.52	Consumer Goods	4
Printing and Publishing	16	0.07	0.08	87.96	152.97	Consumer Goods	5
Other Consumer Goods	44	0.10	0.10	183.51	403.26	Consumer Goods	6
Apparel	42	0.06	0.05	74.74	212.66	Consumer Goods	7
Automobiles and Trucks	20	0.02	0.02	4141.86	731.96	Consumer Goods	15
Communication	89	0.03	0.05	198.98	419.22	Consumer Services	21
Personal and Business Services	268	0.04	0.07	31.83	137.86	Consumer Services	22
Transportation	26	0.02	0.03	90.61	138.44	Consumer Services	25
Restaurants, Hotels, Motels	59	0.04	0.03	40.76	101.79	Consumer Services	28
Healthcare, Medical Equipment, Pharmaceutical Products	143	0.03	0.05	56.05	244.66	Healthcare	8
Chemicals	18	0.03	0.04	63.89	141.39	Industrial Goods	9
Textiles	5	0.02	0.02	43.24	50.28	Industrial Goods	10
Construction and Construction Materials, Steel, Metals etc.	53	0.02	0.04	32.04	136.81	Industrial Goods	11,12,17
Fabricated Products and Machinery	45	0.02	0.02	21.13	44.53	Industrial Goods	13
Electrical Equipment	29	0.02	0.02	126.30	408.19	Industrial Goods	14
Coal, Petroleum and Natural Gas	8	0.02	0.02	28.37	59.92	Industrial Goods	18,19
Business Equipment, Aircraft, ships, and railroad equipment	193	0.02	0.03	37.14	168.40	Industrial Goods	23,16
Business Supplies and Shipping Containers	15	0.03	0.04	82.88	157.52	Industrial Goods	24
Wholesale	41	0.03	0.03	12.73	26.25	Industrial Goods	26
Shops	177	0.07	0.07	99.78	227.12	Retailers	27
Everything Else	30	0.03	0.04	48.18	158.53		30

* Descriptive statistics are reported after 1% winsorization.

Table 2 Variable definitions

Variable	Definition	Data Sources	Period
Advertising Intensity	The ratio of advertising expense to total assets. Advertising expense includes the cost of advertising media and promotional expenses. Other selling and general administrative expenses are excluded.	COMPUSTAT	1995-2015
R_{pt}	Monthly portfolio raw return.	CRSP	1996-2015
$R_{risk\,free,t}$	Risk free rate. The one-month Treasury bill interest rate.	Kenneth French's Data library	1996-2015
$R_{mkt,t}$	Market factor. The excess return on the overall market index.	Kenneth French's Data library	1996-2015
SMB_t	Size factor. The return differential between portfolios of small and large market capitalization stocks.	Kenneth French's Data library	1996-2015
HML_t	Value factor. The return differential between portfolios of stocks with high and low book-to-market ratios.	Kenneth French's Data library	1996-2015
UMD_t	Momentum factor. The return differential between portfolios of past winners and losers.	Kenneth French's Data library	1996-2015

Table 3 Advertising intensity portfolios using Carhart's four-factor model

At the end of June year t from 1996 to 2015, the relative level and changes in advertising intensity (advertising expense relative to total assets) within industry portfolios are formed and held for one year. In panels A and B, Portfolio 1 (P1) represents the firms with low advertising intensity (change) compared to the industry median (change), Portfolio 2 (P2) represents the firms with medium advertising intensity (change) compared to the industry median (change), and Portfolio 3 (P2) represents the firms with high advertising intensity (change) compared to the industry median (change). In panel C, Portfolio 1 (P1) represents the firms with both low advertising intensity and change compared to industry medians. Portfolio 3 (P3) represents the firms with high advertising intensity and change compared to industry medians. The results are average monthly value-weighted portfolio returns, with t-statistics in parentheses (n=234).

$$R_{pt} - R_{risk\ free,t} = \alpha_p + \beta_p (R_{mkt,t} - R_{risk\ free,t}) + s_p SMB_t + h_p HML_t + m_p UMD_t + \varepsilon_{pt}$$

A. Advertising Intensity Level

Portfolio	Intercept	Beta (Market risk)	SMB (Small to Big)	HML (High-Low)	UMD (Momentum)	Adj R2	Raw Return
P1 (Low)	-0.01	0.99	0.50	-0.03	-0.11	0.95	0.75
	(-0.04)	(48.75)	(19.43)	(-1.22)	(-6.65)		(2.06)
P2 (Medium)	0.09	1.09	0.34	-0.14	-0.19	0.95	0.82
	(1.03)	(50.64)	(12.29)	(-4.90)	(-10.48)		(2.08)
P3 (High)	0.30	0.96	0.23	0.01	-0.13	0.92	1.00
	(3.15)	(41.94)	(7.91)	(0.42)	(-6.66)		(3.03)
P3(High)-P1(Low)	0.31	-0.03	-0.27	0.05	-0.01	0.34	0.25
	(3.07)	(-1.27)	(-8.99)	(1.45)	(-0.73)		(2.07)

B. Advertising Intensity Change

Portfolio	Intercept	Beta (Market risk)	SMB (Small to Big)	HML (High-Low)	UMD (Momentum)	Adj R2	Raw Return
P1 (Low)	0.23	0.97	0.30	-0.06	-0.14	0.94	0.92
	(2.53)	(45.00)	(11.00)	(-2.11)	(-7.64)		(2.69)
P2 (Medium)	0.21	1.01	0.23	0.11	-0.15	0.94	0.95
	(2.42)	(49.58)	(8.98)	(3.76)	(-8.66)		(2.75)
P3 (High)	0.37	1.00	0.36	0.01	-0.20	0.92	1.07
	(3.53)	(40.47)	(11.54)	(0.09)	(-9.66)		(2.93)
P3(High)-P1(Low)	0.14	0.03	0.06	0.07	-0.06	0.10	0.15
	(1.41)	(1.24)	(2.03)	(2.07)	(-3.20)		(1.48)

C. Combined Measure - Advertising Intensity Level and Change

Portfolio	Intercept	Beta (Market risk)	SMB (Small to Big)	HML (High-Low)	UMD (Momentum)	Adj R2	Raw Return
P1 (Low)	0.15	0.98	0.40	0.01	-0.14	0.95	0.88
	(1.76)	(49.76)	(15.91)	(0.24)	(-8.35)		(2.50)
P2 (Mixed)	0.27	1.01	0.19	0.05	-0.18	0.93	0.96
	(2.86)	(45.70)	(6.66)	(1.72)	(-10.08)		(2.77)
P3 (High)	0.35	0.99	0.28	0.04	-0.14	0.93	1.07
	(3.60)	(43.09)	(10.21)	(2.78)	(-7.97)		(3.11)
P3(High)-P1(Low)	0.21	0.01	-0.11	0.03	-0.01	0.09	0.20
	(2.05)	(0.35)	(-3.94)	(1.01)	(-0.25)		(1.92)

Table 4 Advertising intensity portfolios across industries

At the end of June year t from 1996 to 2015, all stocks are divided into five industry groups (see Table 1 for details). Within each industry group, stocks are further grouped by the relative level and changes in advertising intensity (advertising expense relative to total assets) within industry portfolios and held for one year. Portfolio 1(P1) represents firms with low advertising intensity level and change compared to the industry median. Portfolio 3 (P3) represents firms with high advertising intensity level and change compared to the industry median. The results are average monthly portfolio value-weighted returns, with t-statistics in parentheses (n=234 months).

$$R_{pt} - R_{risk\ free,t} = \alpha_p + \beta_p(R_{mkt,t} - R_{risk\ free,t}) + s_p SMB_t + h_p HML_t + m_p UMD_t + \varepsilon_{pt}$$

Industry Category		Consumer Goods	Consumer Services	Healthcare	Industrial Goods	Retailers
Average Number of Firms		230	399	171	367	171
P1 (Low)		-0.49	-0.25	0.52	0.26	0.52
		(-1.66)	(-0.77)	(1.50)	(0.68)	(1.50)
P2 (Mixed)		0.21	0.24	0.25	0.24	0.25
		(1.64)	(1.84)	(1.13)	(1.53)	(1.13)
P3 (High)		0.27	0.54	0.25	0.40	0.25
		(1.40)	(2.12)	(0.61)	(1.65)	(0.61)
Abnormal Returns	P3(High)- P1(Low)	0.76	0.79	-0.26	0.14	-0.26
		(2.23)	(2.06)	(-0.62)	(0.61)	(-0.72)