

# Unveiling the Link Between Advertising Spending and Market valuation

Filippo Grandoni - 3187864 - [filippo.grandoni@studbocconi.it](mailto:filippo.grandoni@studbocconi.it)  
Ludovico Panariello - 3192212 - [ludovico.panariello@studbocconi.it](mailto:ludovico.panariello@studbocconi.it)  
Alice Finotti - 3219579 - [alice.finotti@studbocconi.it](mailto:alice.finotti@studbocconi.it)  
Leonardo Tonelli - 3216378 - [leonardo.tonelli@studbocconi.it](mailto:leonardo.tonelli@studbocconi.it)  
Federico Giorgi - 3197626 - [federico.giorgi@studbocconi.it](mailto:federico.giorgi@studbocconi.it)

## Abstract

*This paper investigates the determinants of market valuation in the healthcare sector, focusing on the role of advertising as a key driver. Using a panel dataset of 1,971 firms from 1994 to 2019, we apply econometric models, including Fixed Effects and Random Effects, to explore the relationships between market valuation and advertising intensity, controlling for R&D expenditure, and other firm-specific and market-level factors. Our findings suggest that advertising positively influences market valuation in the healthcare sector, while market growth plays an opposing role. The study provides actionable insights for healthcare managers in facing marketing strategies and advertising expenditures effectively.*

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## Motivation and Objective

When it comes to resource allocations, all firms face a **strategic trade-off between value creation**, including innovating, producing, and delivering products, and **value appropriation**, which involves extracting profits through competitive barriers. Traditionally, healthcare firms have been believed to be primarily driven by innovation and research, with marketing playing a secondary role. Recent trends reflect this belief, showing a decline in marketing budgets within the industry. For instance, the *MM+M/Swoop 2023 Healthcare Marketers Survey* reported an 8% reduction in average marketing budgets, decreasing from \$8.3 million in 2022 to \$7.6 million in 2023.

Despite this trend, there is evidence that **advertising can play a crucial role in the success of healthcare firms**. A study published in *BMC Health Services Research* (2020) demonstrates the positive impact of advertising on patient engagement and communication, emphasizing its potential to drive business performance.

Adding to the complexity, regulatory environments for healthcare advertising show significant differences between regions. In the United States, direct-to-consumer advertising for prescription drugs is permitted, while it is strictly prohibited in Europe. The **lack of regulatory uniformity** poses unique challenges for pharmaceutical companies, influencing how firms allocate marketing budgets and communicate value to both consumers and investors.

This divergence becomes especially important when considering how advertising can be linked to a company's market valuation. Research has shown **positive stock market reactions** when firms increase their focus on value appropriation relative to value creation. *Trading Off Between Value Creation and Value Appropriation: The Financial Implications of Shifts in Strategic Emphasis*, Natalie Mizik and Robert Jacobson (2003), highlights how a shift toward value appropriation ensures that firms capitalize on the full potential of their innovations, which creates investor confidence.

Therefore, the aim of our study is to investigate the determinants of market valuation in the healthcare sector, with a particular focus on the role of **advertising as a key driver**. To capture these relationships, we use econometric models, including Fixed Effects (FE), Random Effects (RE), and interaction terms, ensuring a robust and detailed empirical analysis.

## Data description

The dataset analyzed (*Marketing Insights*) contains panel data describing financial characteristics and the competitive environment for 1,971 firms across various business sectors. It spans the years 1994 to 2019, with records varying in number and duration for each firm. In total, the dataset includes 16,347 observations and 19 variables: *Firm id*, *Year*, *Firm Total Assets*, *Long-term Debt*, *Earnings*, *Cash Flows*, *Sales*, *Market Valuation*, *Firm Value*, *Advertising Expenditure*, *R&D Expenditure*, *Marketing*, *Selling*, and *Operating Expenditure*, *Product Market Threat*, *Product Similarity*, *CMO Presence*, *Firm Age*, *2001 Recession*, *2008 Recession*, and *Business Sector*.

Among these, *Firm id* is a label variable, *CMO Presence*, *2001 Recession*, and *2008 Recession* are dummy variables, and *Business Sector* is categorical. All other variables are numeric. Notably, the dataset contains no missing values.

## Variable Construction

Our analysis focuses on the Healthcare sector (*sector* = 5), which aligns with the scope of our research. In this sector, the dataset includes data for 352 firms, totaling 2,477 observations. Starting from the given dataset, we have derived additional variables to obtain richer insights. Specifically:

- **ROA<sub>*i,t*</sub>**: Return on Assets measures **operational efficiency**. A higher ROA suggests a more efficient use of assets and typically correlates with strong management practices and competitive advantages.

$$ROA_{i,t} = \frac{EBIDTA_{i,t}}{Assets_{i,t}}$$

- **MrktSize<sub>*t*</sub>**: Market Size captures the total volume of the market, providing an indication of the **market's scale and opportunities**. Larger markets typically offer greater potential for revenue growth and economies of scale.

$$Market\ Size_t = \sum_{i=1}^{352} Sales_{i,t}$$

- **MrktGrowth<sub>*t*</sub>**: Market Growth measures the annual growth rate of the total sales within the sector. It reflects the sector's **growth opportunities**, which can influence firm valuation. Higher market growth generally indicates favorable conditions for firms to increase sales and profitability.

$$Market\ Growth_t = \log(Market\ Size_t) - \log(Market\ Size_{t-1})$$

- **MrktTurb<sub>*t*</sub>**: Market turbulence represents the **volatility and unpredictability in the market**, which can influence firm performance and valuation. A higher turbulence may necessitate adaptive strategies and increased marketing or R&D expenditures.

$$Market\ Turbulence_t = \frac{SD(3\ year\ Sales)_t}{Mean(3\ year\ Sales)_t}$$

- **HHI<sub>t</sub>**: HHI measures **market concentration** and is calculated as the sum of the squared market shares of all firms within the market, where market share = (sales) / (total sales of the year). It indicates the **level of competition**, where higher values signify greater market concentration and lower competition.

$$HHI_t = (s_{1,t})^2 + (s_{2,t})^2 + (s_{3,t})^2 + \dots + (s_{n,t})^2$$

## Descriptive Statistics and Trends

To understand the data structure, we explored key variables, including our focal variables, *Market Valuation* and *Advertising Expenditure*, alongside derived market measures: *Market Size*, *Market Growth*, *HHI*, *Market Turbulence*, *Sector-level Advertising Expenditure*, and *Sector-level R&D Expenditure*. The inclusion of derived variables **enriches our analysis**, providing **valuable insights** into the Healthcare sector's structural evolution.

To provide a clear understanding of the data, we computed descriptive statistics and plotted the variables to visualize trends over time - presented in Table 1, Figure 1, Figure 2, Figure 3, Figure 4, Figure 5, Figure 6. This analysis led to the following insights:

### Focal Variables

**Market Valuation:** Mean of \$7,759.4 million with a high standard deviation of \$32,117.9 million, reflecting significant disparities between data points. Skewness (6.2) and kurtosis (45.1) highlight outliers with exceptionally high valuations. Average *Market Valuation* declined between 1995 and 2010, followed by significant growth through 2019. To account for the presence of outliers, the median was also plotted, revealing significant fluctuations accompanied by an overall increasing trend from the late 1990s to 2010.

**Advertising Expenditure:** High variability (mean: \$78.5 million, standard deviation: \$382.2 million) and skewness (6.4), indicating a few data points with disproportionately high advertising spending. *Sector-level Advertising Expenditure*, which corresponds to average advertising expenditure, has declined steadily since 1995 and stabilized at lower levels post-2010. The median analysis revealed a significant drop after 1995, followed by a fluctuating pattern remaining approximately between 0.7 and 1.7.

### Market Analysis Metrics

**Market Size and Market Growth:** *Market Size* has a mean of \$209,160.9 million and a standard deviation of \$68,052.7 million, indicating substantial variability over time. *Market Growth* has an average of 0.1, with occasional extreme periods of growth or contraction (kurtosis: 25.7). Over time, *Market Size* exhibits consistent growth, particularly from 2005 onward, reflecting an expanding sector. However, *Market Growth* remains volatile.

**Sector-level Advertising and R&D Expenditure:** *Sector-level Advertising Expenditure* has a mean of \$78.5 million with moderate variability (std: \$24.3 million), while *Sector-level R&D Expenditure* is higher on average (\$284.3 million) and shows more variability (std: \$103.3 million). Advertising spending is more heavily skewed (skewness: 3.2) compared to R&D (skewness: 1.3). Contrary to advertising expenditure, *Sector-level R&D Expenditure* has grown consistently, particularly after 2010. This reflects a shift in resource allocation, with firms focusing less on traditional advertising strategies and increasing investments in innovation and development.

**Herfindahl-Hirschman Index (HHI) and Market Turbulence:** The *HHI* has a mean of 0.2 and low variability (std: 0.1), with rare instances of high concentration (skewness: 2.3, kurtosis: 8.8), indicating a generally competitive market but occasional dominance by a few firms. From the plot, we observe a significant decline in *HHI* from 1995 (~0.28) to 2010 (~0.125), indicating a shift from a moderately concentrated market to a more competitive and fragmented one. *Market Turbulence* has a mean of 0.1 with low variability (std: 0.1) and occasional extreme spikes (skewness: 3.2, kurtosis: 25.7), reflecting periods of instability in the market. Turbulence dropped in the late 1990s and again in 2006. Later, it followed a fluctuating trend, indicating instability, while maintaining moderate levels (around 0.5).

## Model Development

The Dependent Variable is  $\log(\text{MktVal}_{i,t})$ , as **Market Valuation** offers a comprehensive assessment of firm performance, incorporating investor expectations regarding profitability, growth potential, and associated risks. This variable is particularly pertinent in the healthcare sector, where firms face significant challenges related to R&D investments, regulatory compliance, and competitive intensity. We used the log value for estimation smoothness. To account for the heterogeneity, we will include an extensive dataset of **explanatory and control variables**. The inclusion of controls ensures that other key factors influencing market value are accounted for, enhancing the credibility and relevance of our findings.

### Target Variable:

- $\frac{\text{adi}_{i,t}}{\text{sales}_{i,t}}$ : Advertising Intensity Expenditure is a critical component of a firm's **brand-building strategy**, enhancing consumer awareness and brand loyalty. The intensity is employed to eliminate potential alternative explanations

related to firm size, as larger firms may have higher advertising expenditures and better performance driven by economies of scale. We expect this coefficient to be positive (+) since higher advertising intensity likely increases consumer awareness and brand loyalty, which enhances firm valuation by signaling market strength.

#### Firm level Control Variables:

- $\frac{r\&di,t}{sales_{i,t}}$ : R&D Intensity Expenditure is a key determinant of **innovation**, signaling a firm's commitment to competitive positioning, which is expected to drive long-term growth and positively (+) influence market valuation.
- $CMO_{i,t}$ : the presence of a Chief Marketing Officer reflects the strategic **emphasis on marketing** within the firm. Research indicates that firms with a CMO exhibit superior performance in market valuation (+) due to enhanced strategic marketing capabilities and brand differentiation.
- $ROA_{i,t}$ : Higher Return on Assets, as previously introduced, indicates better **profitability and operational efficiency**, all of which positively (+) influence market valuation.
- $Assets_{i,t}$ : Firm Total Assets serve as a **proxy for firm size**, providing insights into the firm's scale and resource base. Larger firms often benefit from economies of scale, improved market power, and greater stability, all of which positively (+) influence market valuation.
- $threat_{i,t}$ : Product Market Threat reflects the **intensity of competition** within the market. Increased competition likely erodes profit margins and necessitate increased marketing and R&D efforts, negatively (−) impacting market valuation.

#### Sector level Control Variables:

- $HealthS\&P500_t$ : the annual return on the S&P 500 Health Care Sector index serves as a **proxy for sector-level performance**. We expect this coefficient to be positive (+) since a strong performance of the sector reflects favorable macroeconomic conditions, positively influencing firm valuation.
- $HHI_t$ : HHI, as previously introduced, can negatively (−) impact market valuation if excessive market concentration leads to regulatory scrutiny and reduced innovation.
- $MktGrowth_t$ : Market Growth, as previously introduced, should positively (+) influence market valuation since a growing market offers more opportunities for revenue and profit expansion.
- $MktSize_t$ : Market Size, as previously introduced, should positively (+) influence market valuation since larger market size reflects a more substantial opportunity base and better growth prospects, both of which are attractive to investors.
- $MktTurb_t$ : Market Turbulence, as previously introduced, can positively impact valuation (+) by creating opportunities for agile firms to gain competitive advantage and capitalize on market shifts.

**Multicollinearity:** to ensure the integrity of the model and address potential issues of multicollinearity among the predictor variables, we plotted a correlation matrix (Figure 7). The matrix shows **no problematic correlations among most variables**, confirming that our variable selection is appropriate. While there is a strong negative correlation between HHI and market size, this is expected due to the way HHI is derived, as larger markets typically have lower concentration levels.

**Interaction Term:** we included in the analysis an interaction term to capture non-linear dynamics. Additionally, interaction term mitigates omitted variable bias by explicitly modeling how relationships between predictors and outcomes vary under different conditions. This improves the robustness of estimates and provides firms with insights to balance short-term and long-term goals effectively.

- $\left(\frac{adi,t}{sales_{i,t}} \times MktGrowth_t\right)$ : the interaction between Advertising Expenditure and Market Growth term examines how the intensity of a firm's advertising efforts interacts with the growth rate of the market. This approach highlights potential synergies or trade-offs between strategies, enabling firms to optimize resource allocation. However, we expect this coefficient to be negative since in rapidly growing markets, demand often increases organically, **reducing the marginal effectiveness of additional advertising**. Firms may already benefit from market expansion without needing to heavily advertise.

## Econometric approach

### Random Effects v. Fixed Effects

A key concern is the presence of unobserved, time-invariant company-specific characteristics - such as brand reputation, managerial efficiency, or market positioning - that may influence both advertising spending and market value, potentially biasing our estimates.

To address this, we estimate a **Fixed Effects (FE)** model, which controls for unobserved heterogeneity by including company-specific intercepts. This approach focuses on within-company variation over time, isolating how changes in advertising spending affect market value while holding constant time-invariant factors. FE is particularly suitable if company-specific factors are correlated with advertising spending, as theoretical reasoning suggests.

We avoid year-specific dummy variables, assuming that the average returns of the S&P 500 Health Care Sector sufficiently

capture year effects. In the literature, S&P 500 returns are widely used to control for market effects, including macroeconomic changes, shifts in investor sentiment, and large-scale events.

We also estimate a **Random Effects (RE)** model, which assumes that unobserved company-specific effects are random and uncorrelated with the predictors. RE leverages both within- and between-company variation for more efficient estimates, provided the no-correlation assumption holds. To validate this, we conduct a **Hausman test**, which compares the FE and RE models. A rejection of the null hypothesis suggests the RE assumptions do not hold, favouring FE. If the test fails to reject the null, the RE model is preferred for its efficiency and generalizability.

After testing (as reported in Table 2), the Hausman test yielded a p-value smaller than 0.001, indicating that the **FE model is preferred**. Additional robustness tests across different specifications further confirmed the decision. The FE model specification, including the dependent variable, independent variables, and controls, is as outlined in previous sections.

$$\log(\text{MktVal}_{i,t}) = \beta_0 + \beta_1 \frac{\text{ad}_{i,t}}{\text{sales}_{i,t}} \quad (1)$$

$$+ \beta_2 \frac{\text{r\&d}_{i,t}}{\text{sales}_{i,t}} + \beta_3 \text{CMO}_{i,t} + \beta_4 \text{ROA}_{i,t} + \beta_6 \text{Assets}_{i,t} + \beta_7 \text{threat}_{i,t} \quad (2)$$

$$+ \beta_8 \text{HealthS\&P500}_t + \beta_9 \text{HHI}_t + \beta_{10} \text{MktGrowth}_t + \beta_{11} \text{MktSize}_t + \beta_{12} \text{MktTurb}_t \quad (3)$$

$$+ \beta_{13} \left( \frac{\text{ad}_{i,t}}{\text{sales}_{i,t}} \times \text{MktGrowth}_t \right) \quad (4)$$

$$+ \gamma_i + \epsilon_{i,t} \quad (5)$$

Where  $\gamma_i$  represents firm-specific fixed effects.

## Significance Evaluation

Once estimated the FE model, we begin by evaluating the regression results using the **F-test**, which assesses the **overall significance of the model**. The F-test determines whether at least one predictor significantly affects the dependent variable. A p-value close to zero, as in our model, indicates that **the hypothesis of all coefficients to be zero simultaneously is rejected**.

Following the F-test, we evaluate individual predictors using **t-tests**, which examine whether each estimated coefficient differs significantly from zero. Both the target independent variable and the interaction term yield p-values below 0.05, allowing us to confidently reject the null hypothesis at a confidence level of 5% and conclude their **statistical significance**. This approach first establishes the overall relevance of the model through the F-test and then examines the contribution of individual variables using t-tests, ensuring a thorough and structured interpretation of the results.

## Model Results and Interpretation

### Model fit

From the results Table 3 we can observe an **R-squared of 0.45**. This indicates that 45% of the variability in the dependent variable (log of market value) is explained by the independent variables and the model's specifications. This suggests that the model does a good job of capturing the key factors influencing market value. The high R-squared value implies a good fit, leaving only 55% of the variation unexplained. However, while this is a good result, it is important to note that **there may still be unobserved factors** influencing market value that the model does not account for.

### Explanatory variables

Our model is a log-level model, where we applied a logarithmic transformation only to the dependent variable, and scaled advertisement spending by the sales of the company, therefore our target coefficient cannot be directly interpreted as the elasticity. The Fixed Effects (FE) estimated coefficient (extensively shown in Table 4) for advertisement spending is 0.71, which implies that a 1-unit increase in advertisement spending-to-sales ratio is associated with a 71% increase in the market value of the firm, holding other factors constant. More clearly, a 0.1-unit increase in the advertisement spending-to-sales ratio is associated with an approximate 7.1% increase in the market valuation of the firm, holding other factors constant. This positive relationship suggests that **higher advertisement spending to sales ratio is linked to an increase in market value**, potentially indicating a beneficial effect of advertising on firm performance. However, it is worth mentioning that the comparative statements are valid only when market growth is zero, because

$$\frac{\partial \log(\text{MktVal}_{i,t})}{\partial \left( \frac{\text{ad}_{i,t}}{\text{sales}_{i,t}} \right)} = \beta_1 + \beta_{13} \times \text{MktGrowth}_t.$$

### Interaction Effect & Margins Plots

The coefficient for the interaction term between the advertising-to-sales ratio and market growth is -3.04, indicating that **as market growth increases, the marginal effect of advertising on market value decreases**. Specifically, a one-unit

increase in market growth reduces the marginal effect of advertising by 3.04 units, suggesting that **advertising becomes less effective in high-growth markets**.

To explore this relationship, we use **marginal plots** to visualize how the effect of advertising varies with market growth (Figure 8). The plot reveals a clear downward trend, showing that as market growth rises, the impact of advertisement spending diminishes. This provides an intuitive, visual interpretation of the interaction term, illustrating the nuanced relationship between advertising effectiveness and market growth levels.

## Robustness checks

To assess the robustness of our findings, we conducted a **sensitivity analysis** by re-estimating the model while excluding the interaction term. The results, presented in Table 5, reveal that even without the inclusion of the interaction term, the coefficients for our target variable remain **statistically significant**, and their **signs are consistent** with the original model. This consistency in both the magnitude and direction of the coefficients provides strong evidence that our main results are not driven by the interaction effect, further confirming the robustness and reliability of our findings. These results suggest that our conclusions hold under various model specifications, reinforcing the validity of our analysis.

## Managerial Implications

The findings of this study provide compelling managerial insights for firms operating in the healthcare sector, where market dynamics are influenced by innovation, regulatory requirements, and brand perception.

Firstly, the **positive and significant impact of current advertising expenditure** on market value highlights the pivotal role of advertising campaigns. This result underscores the dual function of advertising: **enhancing consumer trust in the firm's offerings** and **signaling financial strength** to investors, as supported by *Joshi and Hanssens (2010)*, divide in direct and indirect effect according to their findings. For healthcare firms, effective advertising can communicate complex product benefits and the firm's commitment to innovation and patient welfare. To maximize returns, managers should prioritize evidence-based advertising strategies that resonate with both consumers and institutional stakeholders.

Secondly, from the regression **the presence of a Chief Marketing Officer (CMO) emerges as a key driver of firm value**, reflecting the importance of marketing leadership in aligning advertising initiatives with organizational objectives. As *Germann, Ebbes, and Grewal (2015)* argue, a CMO's strategic oversight can integrate marketing with broader corporate goals, ensuring that resources are deployed efficiently. In the healthcare sector, where product differentiation often hinges on trust and efficacy, firms without a dedicated CMO should consider creating such a role to enhance marketing impact and align campaigns with patient-centric messaging. This proves how CEOs should give credit to CMO figures, and it hasn't happened properly lately. According to a report from Insider, only a third of CEOs trust CMOs to grow business: this study implies that CMO has an actual impact on the value of the firm and managers should take into account it.

Thirdly, the regression reveals the **significant contribution of current research and development expenditure to market value**, highlighting the critical role of innovation in the healthcare industry. *Chauvin and Hirschey (1993)* showed that **R&D fosters innovation, creating intangible assets that drive long-term firm value**. Healthcare firms, in particular, rely on constant innovation to address rapid technological changes and meet evolving regulatory standards. Managers should adopt a balanced resource allocation approach, viewing **advertising and R&D** not as competing investments but as **complementary mechanisms** for driving growth. For instance, leveraging R&D advancements in marketing campaigns can amplify their market impact, aligning the firm's innovative capabilities with its brand narrative.

Subsequently, managers need to **consider the interaction between advertising and market growth**. The diminishing effect on advertising of market growth highlights that managers have to carefully allocate advertising budgets, considering market trends. Lastly, the healthcare context presents unique challenges that managers must navigate. **Regulatory constraints and ethical considerations** require advertising to be both accurate and patient-focused.

Additionally, **cultural factors may influence consumer responses to advertising**, necessitating a localized approach to campaign design. Managers must also recognize that **the impact of these investments may take time to materialize**.

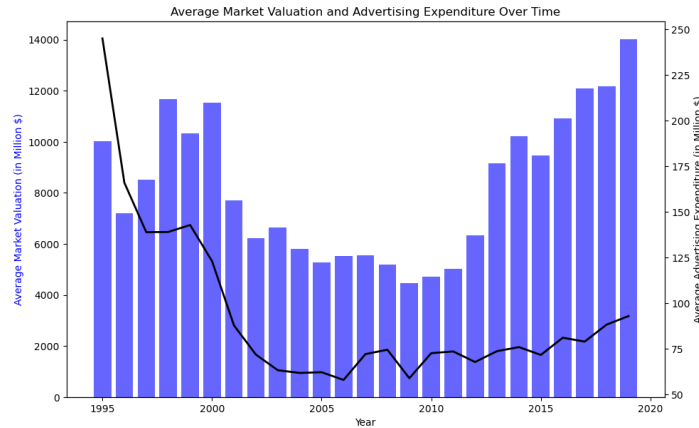
## Conclusion

In conclusion, this study emphasizes the importance of **integrating marketing and advertising** into a cohesive strategy to maximize firm value in the healthcare sector. By leveraging advertising expenditure (and additionally R&D) and ensuring strategic oversight through a dedicated CMO, firms can establish a competitive advantage while delivering measurable financial outcomes - enhancing market value. These insights provide a road-map for managers to navigate the complexities of the healthcare market, ensuring that their investments contribute to both **immediate success and sustained growth**, increasing the firm value.

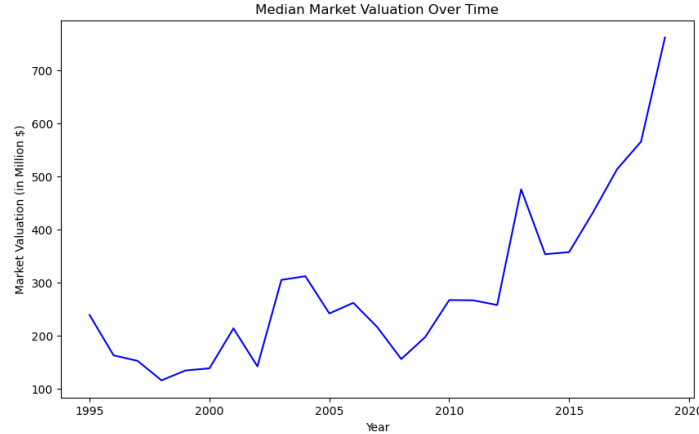
# Appendix

	Mrkt Val	Adv. Exp.	Mrkt Size	Mrkt Growth	Mrkt Turbulence	HHI	Sector-level Advertising Exp.	Sector-level R&D Exp.
Mean	7759.4	78.5	209160.9	0.1	0.1	0.2	78.5	284.3
Standard Deviation	32117.9	382.2	68052.7	0.1	0.1	0.1	24.3	103.3
Min	2.5	0	15487.9	-0.2	0	0	57.9	73.1
Max	384003.8	4000	326519.7	1.1	0.4	0.6	245.1	542.8
Median	272.8	1.2	206009.2	0.1	0.1	0.2	72.5	244.1
Skewness	6.2	6.4	-0.4	3.2	2.3	3.8	3.2	1.3
Kurtosis	45.1	43.9	0.2	25.7	8.8	25.1	14.4	0.9
25th Percentile	75.2	0.3	190662.9	0	0.1	0.2	72.5	207.2
50th Percentile (Median)	272.8	1.2	206009.2	0.1	0.1	0.2	72.5	244.1
75th Percentile	1133.6	6.2	244122.5	0.1	0.1	0.2	81	312.6

**Table 1:** Descriptive Statistics for Key Metrics



**Figure 1:** Average Market Valuation and Advertising Expenditure

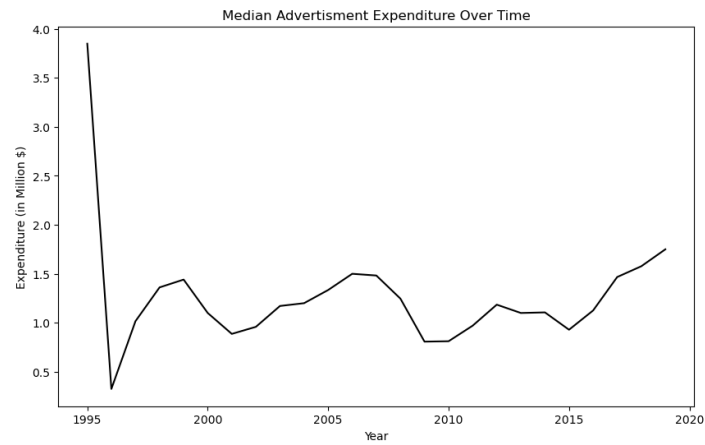


**Figure 2:** Median Market Valuation

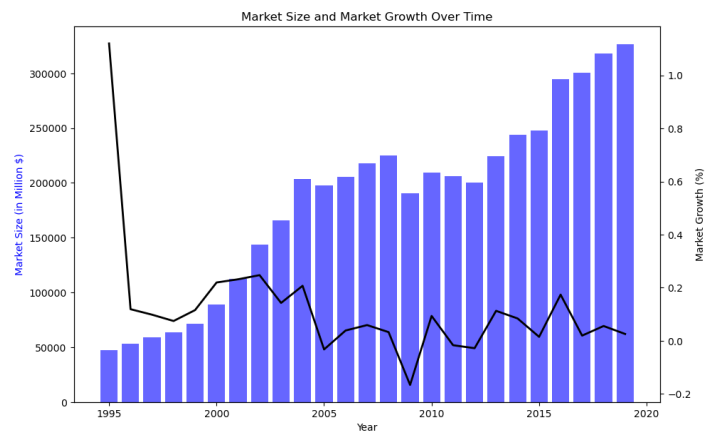
**Table 2:** Hausman Test Results in Different Scenarios for Robustness Check

Scenario	Test Statistic	P-Value
No Interaction No Lags	90.80	3.44e-14
No Interaction With Lags	78.06	9.62e-12
With Interaction No Lags	96.01	9.76e-15
With Interaction With Lags	65.67	4.96e-09

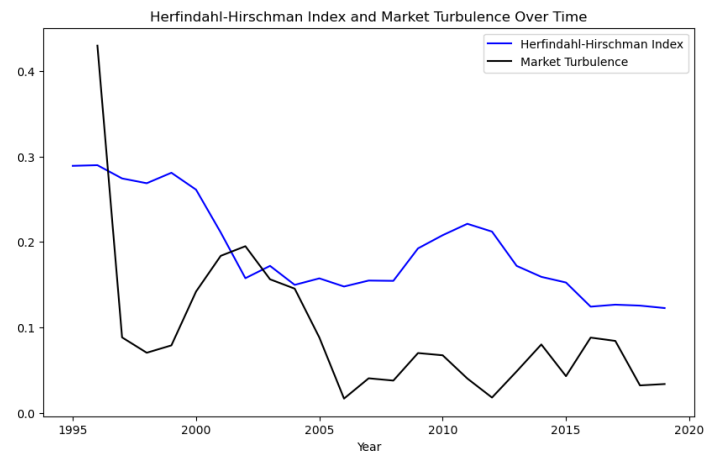
*Lags: Using 1-year lagged advertisement instead of current.*



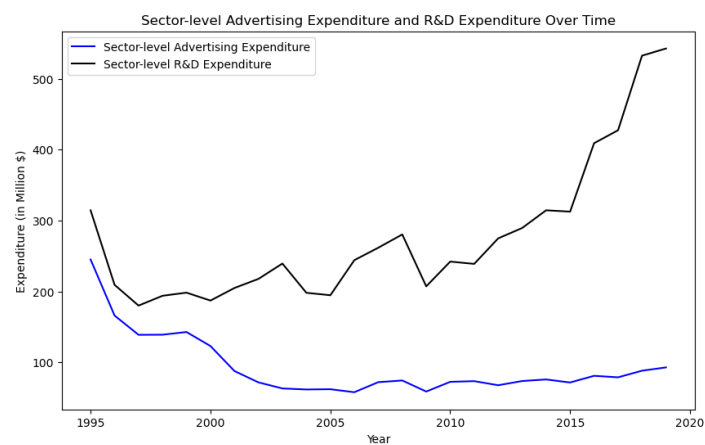
**Figure 3: Median Advertising Expenditure**



**Figure 4: Market Size and Growth**



**Figure 5: HHI and Market Turbulence**



**Figure 6: Sector Adv & R&D expenditures**



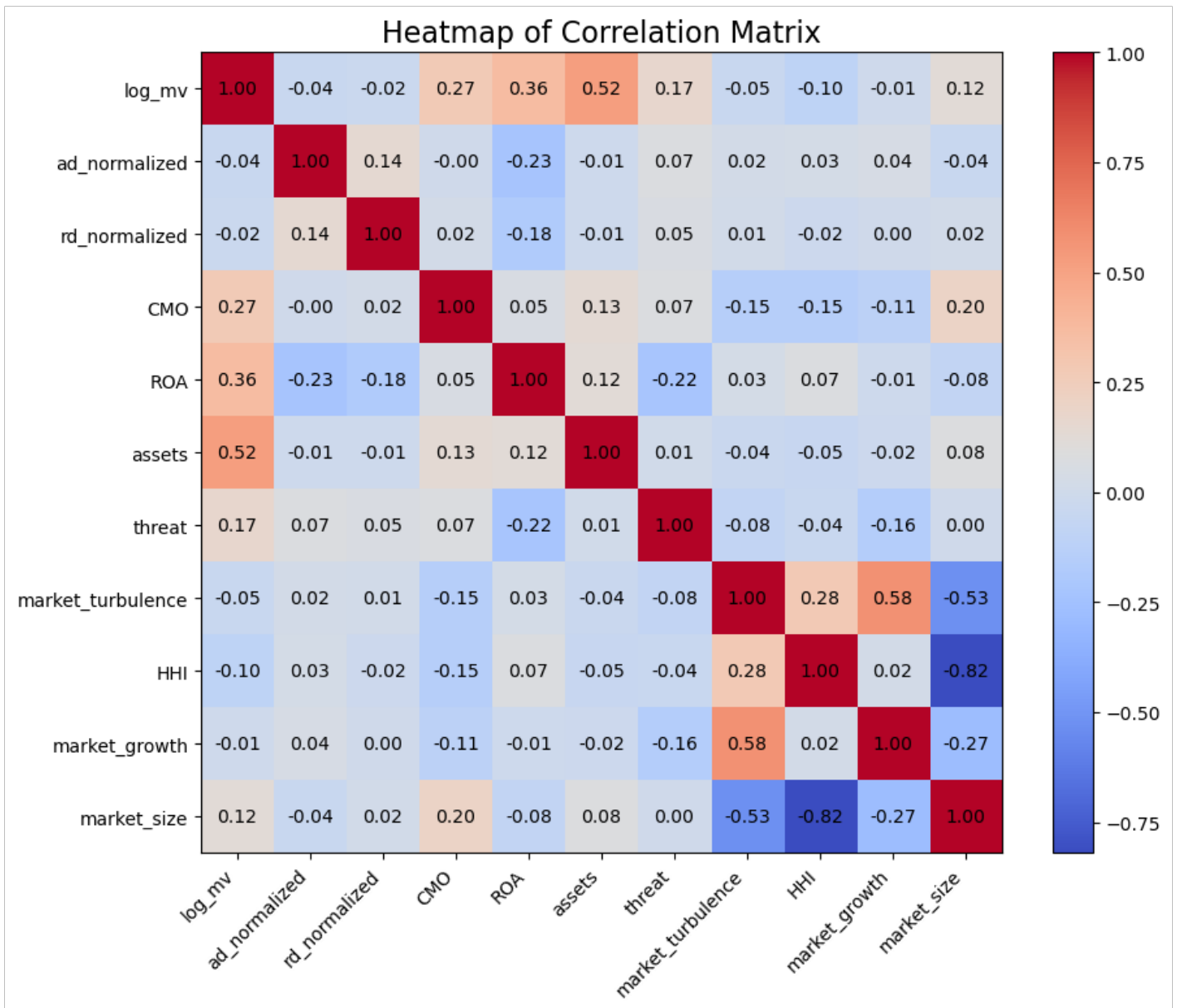


Figure 7: Correlation Matrix

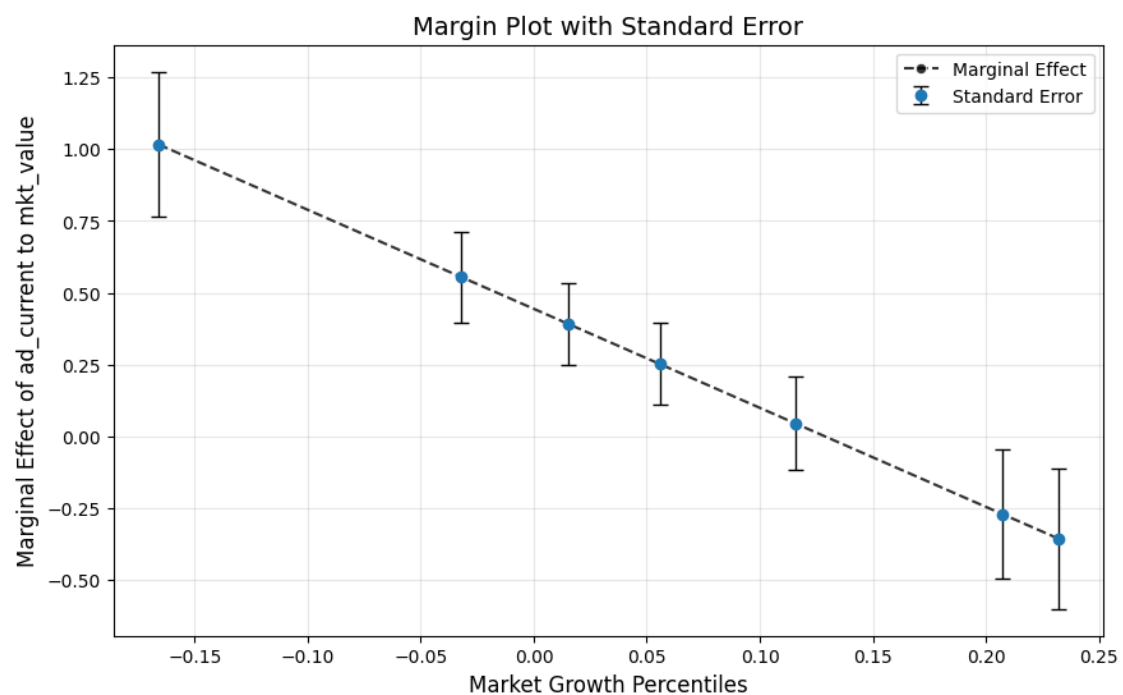


Figure 8: Margin plot for Market Growth interaction

Table 3: Fixed Effects Estimation Overview

Dep. Variable	log_mv
Estimator	Fixed Effects
No. Observations	2123
Entities	308
Time periods	25
R-squared	0.4527
Log-likelihood	-1511.3
F-statistic	<b>143.56</b>
P-value	<b>0.0000</b>

Table 4: Parameter Estimates

Parameter	Estimate	Std. Err.	T-stat	P-value	Lower CI	Upper CI
const	2.9674	0.2723	10.899	0.0000	2.4334	3.5014
ad_norm_current:market_growth	-3.0416	1.3589	-2.2383	0.0253	-5.7067	-0.3764
ad_norm_current	<b>0.7189</b>	0.1514	4.7494	<b>0.0000</b>	0.4220	1.0158
rd_norm_current	0.0448	0.0252	1.7800	0.0752	-0.0046	0.0942
ROA	0.5190	0.0789	6.5760	0.0000	0.3642	0.6738
HHI	-3.2382	0.6818	-4.7492	0.0000	-4.5755	-1.9009
log_assets	0.7408	0.0267	27.779	0.0000	0.6885	0.7932
S&P 500 Health Care Sector	2.142e-06	3.868e-07	5.5383	0.0000	1.383e-06	2.901e-06
CMO	0.0748	0.0398	1.8776	0.0606	-0.0033	0.1529
threat	-0.0033	0.0075	-0.4332	0.6649	-0.0180	0.0115
market_turbulence	-0.1348	0.3165	-0.4258	0.6703	-0.7554	0.4859
market_growth	0.2986	0.1790	1.6682	0.0955	-0.0525	0.6496
total_sales_sector	-3.258e-06	6.689e-07	-4.8717	0.0000	-4.57e-06	-1.947e-06

Table 5: Model Comparison

	NoInteraction	WithInteraction
Dep. Variable	log_mv	log_mv
Estimator	FE	FE
No. Observations	2113	2113
Cov. Est.	Unadjusted	Unadjusted
R-squared	0.4511	0.4527
F-statistic	134.05	123.57
P-value (F-stat)	0.0000	0.0000
const	2.9671**	2.9674**
ad_norm_current	0.6076**	<b>0.7189**</b>
rd_norm_current	0.0485	0.0448
ROA	0.5350**	0.5190**
HHI	-3.2816**	-3.2382**
log_assets	0.7404**	0.7408**
S&P 500 Health Care Sector	0.000002**	0.000002**
CMO	0.0745*	0.0748*
threat	-0.0029	-0.0033
market_turbulence	-0.1340	-0.1348
market_growth	0.1874	0.2986*
total_sales_sector	-0.000003**	-0.000003**
ad_norm_current:market_growth		<b>-3.0416**</b>

Significance levels: \*  $p < 0.1$ , \*  $p < 0.05$ , \*\*  $p < 0.01$

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