Investing in Competitive Advantage: The Impact of Advertising and R&D Intensity on Firm Performance

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Introduction

In today's dynamic business landscape, firms must determine their strategic priorities and constantly invest in these areas to maintain their competitive advantage and achieve superior performance (e.g., Han et al. 2017; Mizik and Jacobson 2003). Internal resources and core competencies play an important role in determining the strategic priorities of firms (e.g., Morgan et al. 2009), as well as the importance of external market factors such as competitive intensity and power of stakeholders (e.g., Porter 2008). Firms' strategic priorities are directly proportional to the investments they make in that priority (e.g., Krishnan et al. 2009). Unsurprisingly, each firm's strategic priorities, and therefore the level of investments to be made in these priorities change depending on that firm's resources and capabilities (e.g., Han et al. 2017).

The business strategy literature shows that firms make strategic investments at different in two main areas: marketing and research and development (R&D) (e.g., Han et al. 2017; Frennea et al. 2019; Mizik and Jacobson 2003). In essence, investments in marketing and R&D reflects a firm's strategic emphasis on and commitment to these two areas. More explicitly, the level of marketing investments demonstrates a firm's commitment to promotional efforts while R&D investments reflect the level of a firm's emphasis on product and process innovations (e.g., Krishnan et al. 2009).

In this study, my main goal is to investigate the impact of firms' marketing and R&D investments on firm performance (i.e., market value and net income). Although there are many studies investigating the (relative) impact of marketing and R&D investments on firm performance (e.g., see Han et al. 2017 for a review), they appear to have progressed in isolation. This study contributes to the literature by investigating the effects of investments in two areas on firm performance. Hence, this study not only replicates the findings of previous studies on the performance effects of marketing and R&D investments (e.g., Han et al. 2017; Mizik and Jacobson 2003; Krishnan et al. 2009) but also extends the scope of previous studies by considering investments in marketing and R&D (e.g., Frennea et al. 2019).

In the following sections, I will first explain the principles of the Resource-Based View and the types of strategic investments to achieve superior performance. Then, I will present the model and its hypotheses, followed by the information about the database and variables I will use to test the proposed model.

Literature Review and Model Development

The Resource-Based View of the Firm

In the strategy literature, there are two main theoretical approaches for explaining firms' relative competitive advantage in the marketplace and thus differences in their market and financial performance: market forces (also known as Porter's Five Forces) (i.e., Porter 2008) and the resource-based view (i.e., Barney 1991).

According to the Market Forces Framework, the firm's relative success and/or competitive advantage is a function of its competitive power and rivalry in the market, which develops and changes over time depending on supplier power, buyer power, threat of substitutes and threat of new entrants (Porter 2008). According to the RBV, firms' internal resources are the most critical factor determining their relative power and position in the market and, therefore, their competitive advantage, which refers to as "a firm's creating more economic value than the marginal (breakeven) competitor in its product market" (Peteraf and Barney 2003, p. 314). The RBV shifts the focus of firms' ability to hold on to the market and maintain their competitive advantage from external factors to the internal organization (Barney 1991). However, RBV does not deny the role and impact of external market forces and sector structures on firms' competitive advantage. Rather, the RBV emphasizes that firms must evaluate their resource formations in constant interaction with external factors. The external market forces and industrial structures in which firms operate determine the combination of current and future resources which determines the potential for long-term success (Peteraf and Barney 2003).

Resources lie in the center of the RBV. Barney and Arikan (2001, p. 138) define resources as “tangible and intangible assets firms use to conceive of and implement its strategies.” More specifically, firm resources are classified in three groups, namely tangible (i.e., physical, financial), intangible (i.e., technology, reputation, human skills and competencies, know-how), and organizational (i.e., positive firm culture and climate) (Barney and Arikan 2001). As Peteraf and Barney (2003, p. 317) note, resources, especially the ones with the power of generating certain capabilities and implementing effective strategies, are not evenly spread across firms (i.e., resource heterogeneity) and firms possess different pool of strategically relevant resources. Firms sustain and maintain their competitive advantage in the market so long as they use their existing internal resources most effectively to create capabilities (i.e., processes) that differentiate them from their competitors (Makadok 2001). Barney and Clark (2007, p. 52) note that a firm has sustainable competitive advantage “when it is creating more economic value than the marginal firm in its sector and when other firms are unable to duplicate the benefits of this strategy.”

According to RBV, the resources must have specific characteristics determining their role in providing competitive advantage. Any resource's ability to create a competitive advantage depends on its value, rarity, inimitability, and non-substitutability (e.g., Barney and Arikan 2001). Some resources are relatively more valuable than the others as they allow a company to create and apply strategies that reduce its overall costs and/or enhance its total revenues more than what would have otherwise been possible (Barney and Arikan 2001, p. 138). When a resource is owned, possessed, or controlled by a small number of firms within the same competitive environment, it becomes rare (Kozlenkova et al. 2014, p. 4). A resource that is costly to obtain or generate for competitors becomes imperfectly inimitable within the marketplace (Kozlenkova et al. 2014, p. 4). An important point that should be emphasized here is that the role and impact of each resource in creating relative competitive advantage are not the same. Some resources, however, do not represent any value on their own unless combined with other resources. Such resources are considered complementary (Morgan et al. 2009), which are also easily substitutable. If firms have resources with VRIN qualifications, they can generate key competencies and capabilities and implement strategies that resist imitation by competitors and provide sustainable competitive advantage (Barney and Hesterly 2012).

It is also noteworthy that the role and impact of a single resource in creating competitive advantage may be limited (Teece 2007). In this context, firms that pool their resources, use them together, and constantly replenish them will be able create valuable, rare, inimitable, and non-substitutable dynamic capabilities that will make them more resilient to external market conditions (Eisenhardt and Martin 2000; Teece 2007). Some of the dynamic capabilities that firms create by pooling their resources are capabilities that cannot be easily imitated by competitors, such as organizational learning and market knowledge creation (Hult and Ketchen 2001).

The dynamic capabilities approach brings a new perspective to the Resource-Based View. It clearly explains how firms can achieve and maintain competitive advantage over time by pooling their resources (Eisenhardt and Martin 2000; Teece 2007). Notably, previous studies in the literature confirm this argument. For example, market orientation (consumer orientation, competitive orientation, and internal inter-functional coordination) and innovativeness are two important resources available to firms and when these two resources are brought together and used interactively, their impact on firm performance is more significant than their impact on their own (Menguc and Auh 2006).

Firm Resources, Strategic Investments, and Superior Performance

As I discussed above, the focus of RBV is on firms using their resources to develop core competencies and capabilities and, as a result, seek to create a sustainable competitive advantage in the marketplace. Yet, resources are not equally distributed across firms (i.e., resource heterogeneity), implying that some firms have limited resources as compared to the others within the same marketplace (e.g., Han et al. 2017). Once firms generate core competencies and capabilities with their limited resources, they must focus on choosing the most appropriate strategies that will make their competitive advantages sustainable and thus enable them to achieve superior performance (Mizik and Jacobson 2003).

The strategic marketing literature identifies two types of strategic investments as a conduit to achieve superior performance, namely value creation and value appropriation (e.g., Han et al. 2017; Frennea et al. 2019; Mizik and Jacobson 2003). As Han et al. (2017, p. 25) note, "Value-creation activities-typically research and development (R&D)-enable a firm to develop new sources of economic rents through activities that create value for customers" whereas "value-appropriation activities-advertising and branding-enable a firm to appropriate greater value by increasing profits from existing customers." However, neither value creation nor value appropriation is sufficient to achieve financial success and therefore firms must utilize both processes with a right balance between these two processes (Frennea et al. 2019; Mizik and

Jacobson 2003). Due to heterogeneity of resources and core competencies across firms, it is inevitable that there will be differences in their emphasis on value appropriation and value creation activities (Han et al. 2017; Mizik and Jacobson 2003). As Han et al. (2017) note, "value-creation processes are explorative (e.g., inventing a new technology), whereas value-appropriation processes are exploitative (e.g., refining and implementing an existing technology)." The indicator of the strategic decision firms make between value creation and value appropriation is how much they invest in each process in relative terms (e.g., Frennea et al. 2019; Mizik and Jacobson 2003).

Model and Hypotheses

Drawing from the premises of the RBV and the literature on value creation and appropriation (e.g., Han et al. 2017; Frennea et al. 2019; Mizik and Jacobson 2003; Krishnan et al. 2009), I argue that firms will make R&D and marketing (i.e., sales promotion and advertising) investments to increase their competitive advantages and achieve superior performance with the relative capabilities they will gain by pooling their resources. I identify R&D investments as strategic priorities based on value appropriation, and marketing investment as a strategic priority based on value creation. I will operationalize the extent of R&D investments using the intensity measure (i.e., the ratio of R&D expenditures to total assets). I will employ advertising intensity (i.e., the ratio of advertising expenditures to total assets) as a proxy to marketing investments (e.g., Han et al. 2017; Frennea et al. 2019; Mizik and Jacobson 2003). I define firm performance in terms of Tobin's q (i.e., firm market value) and net income. As discussed earlier, firms must emphasize on both value creation and value appropriation, albeit at varying level, to achieve superior performance (e.g., Frennea et al. 2019; Mizik and Jacobson 2003). Accordingly, I formally propose the following:

H1: (a) Advertising intensity and (b) R&D intensity will have a significant effect on a firm's Tobin's q.

H2: (a) Advertising intensity and (b) R&D intensity will have a significant effect on a firm's net income.

Using these baseline hypotheses, I will also investigate the "trade-off" between the two types of investments by conducting additional analyses.

Methods

Sample and Data

The dataset for this study is extracted from Compustat, accessed via Wharton Research Data Services (WRDS). Compustat is a comprehensive database of financial and market data about publicly traded firms, predominantly covering the U.S. market while also encompassing international firms. This database offers data ranging from annual and quarterly financial statements to daily stock prices and critical financial ratios. Each firm within Compustat is uniquely tagged using the "GVKEY", allowing for compatibility with other datasets through identifiers like CUSIP and ISIN. Accordingly, the proposed model will be tested using firm-level panel data between the years 2012 to 2022 obtained from Compustat.

Comprehensive data on both dependent and independent variables were available for each firm, on the rare occasions where values were missing, they were replaced with the firm's average for that variable. I used a sample of 92 companies operating under four separate sector codes according to the S&P 500 classification. These sectors are represented by the codes '20', '25', '35', and '45'. The '20' code stands for the Industrials sector, which includes companies involved in manufacturing, infrastructure, and transportation. The '25' code defines the

Consumer Discretionary sector, highlighting firms that produce goods and services considered non-essential by consumers, such as luxury items, entertainment, and automobiles. The '35' code is associated with Health Care, comprising companies in the fields of pharmaceuticals, medical technology, and health care providers and services. Finally, the '45' code denotes the Information Technology sector, encompassing businesses that offer software, hardware, electronics, and information technology services (see Table 1).

Table 1. S&P Code, Types of Firms, and Sample

S&P Code and Sector	Firm Type	Number of Firms in Sample (%)
20 (Industrial)	Manufacturing, infrastructure, and transportation	13 (14.13%)
25 (Consumer Discretionary)	Luxury items, entertainment, and automobiles	26 (28.26%)
35 (Health Care)	Pharmaceuticals, medical technology, and health care providers and services	21 (22.83%)
45 (Information Technology)	Software, hardware, electronics, and information technology services	32 (34.78%)

Measures

The variables used in this study can be grouped in three broad categories, namely independent variables, dependent variables, and control variables.

Independent variables. The two independent variables employed in this study are advertising intensity and R&D intensity. Advertising intensity will be operationalized as the ratio of annual advertising and selling expenditures to assets. Similarly, R&D intensity will be measured as the ratio of annual R&D expenditures to assets (Mizik and Jacobson 2003).

Dependent variables. Firm performance is measured by capturing both market valuation (i.e., Tobin's q) and actual profitability (i.e., net income). Following Chung and Pruitt 1994), Tobin's q will be operationalized as follows:

- Tobin's q = (MVE+PS+DEBT)/TA

where,

- MVE = The closing prices of shares at the end of the financial year × number of common shares outstanding
- PS = The liquidation value of outstanding preferred stock
- DEBT = (Current liabilities – current assets) + (book value of inventories) + (long-term debt)
- TA= The book value of total assets

It is worth noting that using these two different performance indicators provides a holistic approach to corporate success and allows a more comprehensive examination of firm success by considering external market perceptions and internal financial success.

Control variables. In addition to the focal independent variables of the proposed model, I will also check the impact of other variables on two performance indicators. It is important to include other factors that may impact firm performance in the model estimation and thus consider alternative approaches to explaining firm performance (i.e., Tobin's q and net income). I used cost of goods sold, intangible assets, inventories, cash and cash equivalents, and common equity as control variables because they are essential in evaluating firm performance. Cost of Goods Sold (cogs), which covers direct production costs, is necessary to consider internal efficiency and gross margin. Intangible Assets (intan), representing non-physical assets such as patents and goodwill, influence competitive advantage and market value and potentially increase sales through strong brand awareness. Cash and Cash Equivalents (ch) refer to a firm's liquidity and reflect its ability to quickly convert assets into cash, which is vital for investments and managing crises. Inventories (invt) as a control variable can be indicative of a firm's size and operational scale. Larger inventories might suggest a bigger, more expansive operation with a wider range of products and greater market reach. Finally, Common Equity (ceql), the value returned to shareholders upon liquidating assets and payment of liabilities, measures financial stability and resilience. Together, these variables provide a comprehensive understanding of a firm's operational and financial health, which is essential for a detailed analysis of firm performance.

Model Estimation

In this study, I will estimate both fixed effects and random effects models for testing the hypotheses (H1 and H2) and gaining a deeper insight of the hypothesized relationships. First, I will estimate a fixed effects model testing the effect of advertising and R&D intensity on Tobin's q and net income (Models 1 and 2). Second, I will estimate a random effects model testing the effect of advertising and R&D intensity on Tobin's q and net income (Models 3 and 4).

I will include the dependent and independent variables in the models after subjecting them to log transformation in line with the assumption of linearity, which is the standard multiple regression modeling criterion. Additionally, I check for heteroscedasticity by performing the Breusch and Pagan test for each model. I will report robust standard errors whenever the test is statistically significant (i.e., the null hypothesis is rejected).

Analyses and Results

As Wooldridge (2012, p. 496) state, "It is still fairly common to see researchers apply both random effects and fixed effects, and then formally test for statistically significant differences in the coefficients on the time-varying explanatory variables." I performed both fixed and random effects modeling approaches to estimate the model and test the hypotheses. This approach allows for a thorough comparison of results, enhancing our understanding of the robustness and consistency of the findings across these distinct statistical methodologies. Next, I present the results.

Fixed Effects Modelling

I report below the results of a fixed effects model testing the effect of advertising and R&D intensity on Tobin's q (Model 1) and net income (Model 2). It is worth noting that I did not include sector dummies when estimating the fixed effects models. The reason is that multicollinearity is encountered due to insufficient intra-sector variation to estimate separate effects for each sector. This implies that the fixed effects model is not suitable for distinguishing the effects of different sectors on performance variables. As a result, it is impossible to reveal the significance of cross-sector differences using the fixed effects approach alone.

Model 1

Table 2. Fixed Effects Model (DV = Tobin's q)

Dep. Variable	log_tobins_q
No. Observations	860
Log-likelihood	13.897
R-squared	0.310
R-squared (Between)	-4.320
R-squared (Within)	0.310
R-squared (Overall)	-4.076
F-statistic (Robust)	15.444
P-value	0.000
Durbin-Watson Statistic	0.905
Breusch-Pagan Test	0.000

Variables	**Parameter**	**Std. Err.**	**T-stat**	**P-value**	**Lower CI**	**Upper CI**
log_RnD_Intensity	0.321	0.059	5.408	0.000**	0.205	0.438
log_Advertising_Intensity	0.166	0.047	3.567	0.000**	0.075	0.257
cogs	0.000	0.000	2.120	0.034*	0.000	0.000
intan	0.000	0.000	-5.508	0.000**	0.000	0.000
invt	0.000	0.000	-3.267	0.001**	0.000	0.000
ch	0.000	0.000	-0.045	0.964	0.000	0.000
ceql	0.000	0.000	0.773	0.440	0.000	0.000
Year_2013	0.126	0.049	2.554	0.011*	0.029	0.223
Year_2014	0.192	0.048	3.974	0.000**	0.097	0.286

Year_2015	0.168	0.046	3.647	0.000**	0.078	0.259
Year_2016	0.228	0.043	5.270	0.000**	0.143	0.313
Year_2017	0.340	0.047	7.289	0.000**	0.248	0.431
Year_2018	0.337	0.045	7.428	0.000**	0.248	0.427
Year_2019	0.431	0.047	9.068	0.000**	0.338	0.524
Year_2020	0.491	0.053	9.327	0.000**	0.388	0.595
Year_2021	0.585	0.054	10.846	0.000**	0.479	0.691
Year_2022	0.376	0.055	6.803	0.000**	0.267	0.484

Note: Robust standard errors are reported.
* P-value < 0.1
** P-value < 0.05

The fixed effects model with year dummy variables shows a significant explanatory power with an R-squared of 0.310, meaning it accounts for approximately 31% of the variance in the log-transformed Tobin's q. The Durbin-Watson statistic of 0.905 points towards a moderate degree of positive autocorrelation within the residuals, which is a common characteristic in panel data but does again warrant careful interpretation of the results.

Focusing on the independent variables, R&D intensity shows a significant positive effect on Tobin's q with a coefficient of 0.321, indicating that a 1% increase in R&D intensity is associated with an average 0.32% increase in Tobin's q, holding other factors constant. This highlights the importance of R&D investments in enhancing company value. Similarly, advertising intensity has a positive coefficient of 0.166 on Tobin's q, suggesting that a 1% increase in advertising intensity corresponds to roughly a 0.17% increase in Tobin's q, on average. This finding also underscores the value of advertising investments in influencing company valuation. The statistical significance of these variables (p-value < 0.05) validates their role in the financial metrics of companies across the dataset. Accordingly, H1a and H1b that posit that advertising intensity and R&D intensity will have a significant effect on a firm's Tobin's q are supported. Conversely, the coefficients of control variables exhibit varying degrees of significance, indicating their differing roles in affecting Tobin's q across different sectors and time periods.

Model 2

Table 3. Fixed Effects Model (DV = Net Income)

Dep. Variable	log_ni
No. Observations	860
Log-likelihood	-1955.7
R-squared	0.0595
R-squared (Between)	0.5419
R-squared (Within)	0.0595
R-squared (Overall)	0.4727
F-statistic (Robust)	2.0458
P-value	0.000
Durbin-Watson Statistic	1.758
Breusch-Pagan Test	0.000

Variables	**Parameter**	**Std. Err.**	**T-stat**	**P-value**	**Lower CI**	**Upper CI**
log_RnD_Intensity	-1.579	0.602	-2.624	0.009**	-2.761	-0.398
log_Advertising_Intensity	0.612	0.582	1.05	0.294	-0.532	1.755
cogs	0.000	0.000	2.328	0.020*	0.000	0.000
intan	0.000	0.000	-2.336	0.020*	0.000	0.000
invt	0.000	0.000	-1.391	0.165	-0.001	0.000
ch	0.000	0.000	-0.653	0.514	0.000	0.000
ceql	0.000	0.000	1.316	0.189	0.000	0.000
Year_2013	0.462	0.351	1.315	0.189	-0.228	1.152
Year_2014	0.346	0.379	0.913	0.361	-0.398	1.090
Year_2015	0.416	0.369	1.127	0.260	-0.309	1.141
Year_2016	0.203	0.425	0.478	0.633	-0.632	1.038
Year_2017	0.604	0.443	1.364	0.173	-0.265	1.472
Year_2018	0.908	0.423	2.145	0.032*	0.077	1.738
Year_2019	0.890	0.442	2.012	0.045*	0.022	1.758
Year_2020	0.422	0.480	0.879	0.380	-0.521	1.365
Year_2021	1.754	0.446	3.934	0.000**	0.879	2.629
Year_2022	0.859	0.559	1.537	0.125	-0.238	1.956

Note: Robust standard errors are reported.
* P-value < 0.1
** P-value < 0.05

Table 3 reports that R&D intensity has a negative and significant effect on net income (b = -1.579). This implies that for every 1% increase in R&D intensity, there is an estimated 1.58%

decrease in net income, on average. This substantial inverse relationship suggests that increased spending on R&D, while potentially boosting market valuation (as seen in Tobin's q model), might simultaneously lead to a reduction in immediate net income, possibly due to the high costs or long-term nature of R&D investments. Conversely, the model indicates that a 1% increase in advertising intensity is associated with a 0.61% increase in net income, on average. However, it's important to note that this relationship is not statistically significant, with a p-value of 0.294, implying a less definitive impact of advertising intensity on net income than R&D intensity. Accordingly, H2a and H2b that posit that advertising intensity and R&D intensity will have a significant effect on a firm's net income are not supported.

It is also worth noting that the results imply that advertising and R&D intensity better explain the company's market valuation variations than net income. The higher number of significant control and year dummy variables in Tobin's q (Model 1) further contributes to its more robust explanatory capacity. This suggests that Tobin's q is a more comprehensive and effective tool for understanding the contributions of R&D and advertising intensity to firm performance.

Random Effects Modelling

Unlike fixed effects modeling, the random effects model successfully eliminated the problem of multicollinearity. By treating sector effects as random variations around a common mean, this model allowed examining how different sectors were related to varying levels of performance variables. This approach highlighted the significant impact of sector affiliations on performance variables and facilitated analysis of how other variables might interact with these sector influences. Thus, the random effects model provided valuable information about the importance of sector differences and their interaction with other factors. I report below the results of a random effects model testing the effect of advertising and R&D intensity on Tobin's q (Model 3) and net income (Model 4).

Model 3

Table 4. Random Effects Model (DV = Tobin's q)

Dep. Variable	log_tobins_q
No. Observations	860
Log-likelihood	-74.211
R-squared	0.452
R-squared (Between)	0.820
R-squared (Within)	0.252
R-squared (Overall)	0.776
F-statistic (Robust)	30.108
P-value	0.000
Durbin-Watson Statistic	0.785
Breusch-Pagan Test	0.000

Variables	**Parameter**	**Std. Err.**	**T-stat**	**P-value**	**Lower CI**	**Upper CI**
log_RnD_Intensity	0.034	0.035	0.963	0.336	-0.035	0.103
log_Advertising_Intensity	-0.078	0.035	-2.221	0.027*	-0.147	-0.009
cogs	0.000	0.000	3.025	0.003**	0.000	0.000
intan	0.000	0.000	-7.824	0.000**	0.000	0.000
invt	0.000	0.000	-3.182	0.002**	0.000	0.000
ch	0.000	0.000	-0.973	0.331	0.000	0.000
ceql	0.000	0.000	-0.391	0.696	0.000	0.000
Sector_25	0.589	0.125	4.730	0.000**	0.345	0.834
Sector_35	0.875	0.144	6.093	0.000**	0.593	1.157
Sector_45	0.656	0.144	4.568	0.000**	0.374	0.938
Year_2013	0.150	0.043	3.465	0.001**	0.065	0.235
Year_2014	0.211	0.043	4.916	0.000**	0.127	0.295
Year_2015	0.193	0.042	4.591	0.000**	0.111	0.276
Year_2016	0.252	0.039	6.476	0.000**	0.175	0.328
Year_2017	0.364	0.044	8.365	0.000**	0.279	0.449
Year_2018	0.379	0.043	8.882	0.000**	0.295	0.462
Year_2019	0.458	0.046	9.910	0.000**	0.368	0.549
Year_2020	0.491	0.051	9.669	0.000**	0.391	0.591
Year_2021	0.594	0.053	11.214	0.000**	0.490	0.699
Year_2022	0.399	0.053	7.507	0.000**	0.295	0.504

Notes: (1) Sector_20 is the base sector. (2) Robust standard errors are reported.
* P-value < 0.1
** P-value < 0.05

The random effects model applied to log-transformed Tobin's q provides a different perspective and a comprehensive overview of the factors influencing market valuation across various entities. With an R-squared of 0.452, the model explains about 45.2% of the overall variance in Tobin's q. This aligns with the general expectation that random effects models tend to have higher R-squared values than fixed effects models, as they account for both within-cluster and between-cluster variations. However, the Durbin-Watson statistic of 0.785 indicates a low to moderate positive autocorrelation in the residuals, suggesting that sequential observations for the same cluster are somewhat correlated.

A high "R-squared Between" suggests that the model effectively captures the differences in Tobin's q values from one company to another. This implies that the model's variables significantly differentiate the financial valuation between various companies. It indicates that these companies have distinct characteristics or operate in different conditions that significantly impact their market valuation. The lower "R-squared Within" value indicates that the model is less effective in explaining the variance in Tobin's q within the same firms over time. This means that the changes in Tobin's q for a single firm from year to year are not as well explained by the model's variables. This suggests that the model is better at describing why different companies might have varying levels of Tobin's q. Yet, it's less capable of explaining why a single company's Tobin's q might fluctuate from one year to the next.

Focusing on the independent variables, R&D and advertising intensity show contrasting effects on Tobin's q. R&D intensity has a relatively small and statistically insignificant effect (coefficient: 0.034, p-value: 0.336), suggesting a limited direct influence on Tobin's q. In contrast, advertising intensity is related negatively to Tobin's q (coefficient: -0.078, p-value: 0.027), indicating that increased advertising intensity might be associated with decreased market valuation. Accordingly, the results of the random effect model did not support H1a and H1b. The year dummies also display significant effects, with coefficients progressively increasing on average.

Model 4

Table 5. Random Effects Model (DV = Net Income)

Dep. Variable	log_ni
No. Observations	860
Log-likelihood	-2024.4
R-squared	0.593
R-squared (Between)	0.927
R-squared (Within)	0.020
R-squared (Overall)	0.823
F-statistic (Robust)	134.910
P-value	0.000
Durbin-Watson Statistic	1.576
Breusch-Pagan Test	0.000

Variables	**Parameter**	**Std. Err.**	**T-stat**	**P-value**	**Lower CI**	**Upper CI**
log_RnD_Intensity	-1.285	0.224	-5.729	0.000**	-1.725	-0.845
log_Advertising_Intensity	0.094	0.219	0.430	0.667	-0.335	0.524
cogs	0.000	0.000	-1.477	0.140	0.000	0.000
intan	0.000	0.000	-0.779	0.436	0.000	0.000
invt	0.000	0.000	1.428	0.154	0.000	0.000
ch	0.000	0.000	0.549	0.583	0.000	0.000
ceql	0.000	0.000	3.784	0.000**	0.000	0.000
Sector_25	-0.096	0.559	-0.172	0.864	-1.192	1.001
Sector_35	1.774	0.468	3.793	0.000**	0.856	2.692
Sector_45	2.236	0.515	4.344	0.000**	1.226	3.246
Year_2013	0.705	0.362	1.946	0.052	-0.006	1.417
Year_2014	0.583	0.384	1.517	0.130	-0.171	1.337
Year_2015	0.609	0.398	1.530	0.126	-0.172	1.389
Year_2016	0.445	0.447	0.994	0.320	-0.433	1.323
Year_2017	0.741	0.413	1.796	0.073	-0.069	1.55
Year_2018	1.023	0.416	2.459	0.014*	0.207	1.84
Year_2019	0.901	0.452	1.992	0.047*	0.013	1.789
Year_2020	0.293	0.486	0.602	0.547	-0.661	1.246
Year_2021	1.577	0.402	3.921	0.000**	0.788	2.367
Year_2022	0.551	0.527	1.046	0.296	-0.483	1.585

Notes: (1) Sector_20 is the base sector. (2) Robust standard errors are reported.
* P-value < 0.1

** P-value < 0.05

Like the fixed effects model, the random effects model with net income, with an R-squared value of 0.593, does provide insights into factors influencing net income. Yet, its explanatory power is less robust than models focusing on Tobin's q. Given the mixed significance and varying coefficients of critical variables like R&D and advertising intensity, this model may not be as effective for continuing net income analysis as a primary success factor. Nevertheless, the results of the random effect model did not support H2a and H2b.

In the next section, I will look in more detail at the results obtained by performing additional tests.

Additional Tests

I conducted a series of additional analyses. Firstly, I estimated the fixed effects model (Model 1) for Tobin's q separately for each sector. I performed this test only for Tobin's q because the effect of both advertising and R&D intensity on Tobin's q was supported. Additionally, I adopted this approach because the fixed effects model exhibits significant multicollinearity issues when sector dummies are included. Secondly, recall that the random effect model (Models 3 and 4) testing the effects of advertising and R&D intensity on Tobin's q and net income did not yield significant results. Therefore, I examine the impact of advertising and R&D intensity on Tobin's q in more detail. That is, I tested the interaction of sector with advertising and R&D intensity on Tobin's q. Through this additional test, I assume that the effect of advertising and R&D intensity on the dependent variable cannot be direct but may vary across sectors. Thirdly, I reported the skewness and kurtosis test results for Models 1-4 and explained the statistical justification of the logarithmic transformation I applied for the dependent and independent variables. Finally, I analyzed to check the variance inflation factor for all variables employed in the models.

Fixed effects model for Tobin's q for each sector. The results from the fixed effects models across different sectors (Tables 6-9) reveal the impact of sector-specific characteristics on the financial valuation of companies, as measured by log-transformed Tobin's q. For example, in the Information Technology sector (Sector 45), where the R-squared is relatively high (0.560), the variables included in the model together play an important role in influencing the market valuation of companies. This contrasts with the Customer Discretionary sector (Sector 25), where a lower R-squared of 0.203 indicates that the same factors are less effective in explaining the variance in Tobin's q. These discrepancies underline the unique operational and market dynamics that characterize each sector.

In all four models, the effect of advertising and R&D intensity on Tobin's q indicate no variation across sectors, except the effect of R&D intensity on Tobin's q in sector 45 (i.e., information technology). The varying levels of explanatory power and the differing significance of all variables across sectors emphasize that sector context may be crucial in understanding firm performance. The significance of year dummies across all models, notably in the industrial sector (Sector 20) with significant effects in later years, points to the influence of temporal factors on Tobin's q. This indicates that external market conditions or broader economic trends may play a critical role in shaping company valuations. The Durbin-Watson statistics values, such as 0.926 for Sector 20 and 1.183 for Sector 25, further suggest varying degrees of autocorrelation in these models. While some autocorrelation is expected in panel data, these values necessitate careful interpretation of the results, as they may indicate underlying patterns or trends specific to each sector that the fixed effects model does not fully capture.

Table 6. Fixed Effects Model for Sector 20 (DV = Tobin's q)

Dep. Variable	log_tobins_q
No. Observations	133
Log-likelihood	65.328
R-squared	0.547
R-squared (Between)	-0.540
R-squared (Within)	0.547
R-squared (Overall)	-0.485
F-statistic (Robust)	6.997
P-value	0.000
Durbin-Watson Statistic	0.926

Variables	**Parameter**	**Std. Err.**	**T-stat**	**P-value**	**Lower CI**	**Upper CI**
log_RnD_Intensity	-0.042	0.155	-0.272	0.786	-0.350	0.265
log_Advertising_Intensity	0.150	0.159	0.949	0.345	-0.164	0.465
cogs	0.000	0.000	1.333	0.186*	0.000	0.000
intan	0.000	0.000	-2.862	0.005**	0.000	0.000
invt	0.000	0.000	-1.749	0.083*	0.000	0.000
ch	0.000	0.000	-1.551	0.124	0.000	0.000
ceql	0.000	0.000	-0.219	0.827	0.000	0.000
Year_2013	0.204	0.075	2.727	0.007**	0.056	0.352
Year_2014	0.242	0.085	2.858	0.005**	0.074	0.411
Year_2015	0.187	0.076	2.473	0.015**	0.037	0.338
Year_2016	0.304	0.071	4.282	0.000**	0.163	0.445
Year_2017	0.419	0.079	5.331	0.000**	0.263	0.575
Year_2018	0.322	0.079	4.086	0.000**	0.166	0.479
Year_2019	0.477	0.079	6.08	0.000**	0.322	0.633
Year_2020	0.550	0.076	7.216	0.000**	0.399	0.702
Year_2021	0.696	0.085	8.232	0.000**	0.528	0.863
Year_2022	0.463	0.084	5.523	0.000**	0.297	0.630

Note: Robust standard errors are reported.

* P-value < 0.1

** P-value < 0.05

Table 7. Fixed Effects Model for Sector 25 (DV = Tobin's q)

Dep. Variable	log_tobins_q
No. Observations	247
R-squared	0.203
R-squared (Between)	-0.436
R-squared (Within)	0.203
R-squared (Overall)	-0.406
Log-likelihood	95.905
F-statistic (Robust)	3.779
P-value	0.000
Durbin-Watson Statistic	1.183

Variables	**Parameter**	**Std. Err.**	**T-stat**	**P-value**	**Lower CI**	**Upper CI**
log_RnD_Intensity	0.093	0.114	0.817	0.415	-0.132	0.318
log_Advertising_Intensity	0.008	0.058	0.146	0.884	-0.106	0.122
cogs	0.000	0.000	1.239	0.217	0.000	0.000
intan	0.000	0.000	-0.309	0.758	0.000	0.000
invt	0.000	0.000	0.890	0.374	0.000	0.000
ch	0.000	0.000	-0.930	0.353	0.000	0.000
ceql	0.000	0.000	-3.695	0.000**	0.000	0.000
Year_2013	0.123	0.066	1.863	0.064	-0.007	0.252
Year_2014	0.143	0.060	2.393	0.018*	0.025	0.261
Year_2015	0.131	0.060	2.188	0.030*	0.013	0.249
Year_2016	0.165	0.052	3.174	0.002**	0.063	0.267
Year_2017	0.208	0.058	3.594	0.000**	0.094	0.322
Year_2018	0.152	0.058	2.602	0.010*	0.037	0.266
Year_2019	0.144	0.062	2.320	0.021*	0.022	0.266
Year_2020	0.180	0.078	2.316	0.022*	0.027	0.334
Year_2021	0.235	0.073	3.220	0.002**	0.091	0.379
Year_2022	0.075	0.071	1.056	0.292	-0.065	0.214

Note: Robust standard errors are reported.
* P-value < 0.1
** P-value < 0.05

Table 8. Fixed Effects Model for Sector 35 (DV = Tobin's q)

Dep. Variable	log_tobins_q
No. Observations	196
Log-likelihood	-5.941
R-squared	0.305
R-squared (Between)	0.031
R-squared (Within)	0.305
R-squared (Overall)	-0.005
F-statistic (Robust)	6.599
P-value	0.000
Durbin-Watson Statistic	0.909

Variables	**Parameter**	**Std. Err.**	**T-stat**	**P-value**	**Lower CI**	**Upper CI**
log_RnD_Intensity	0.147	0.104	1.418	0.158	-0.058	0.352
log_Advertising_Intensity	-0.061	0.147	-0.417	0.677	-0.350	0.228
cogs	0.000	0.000	0.369	0.713	0.000	0.000
intan	0.000	0.000	-3.754	0.000**	0.000	0.000
invt	0.000	0.000	1.207	0.229	0.000	0.000
ch	0.000	0.000	-1.251	0.213	0.000	0.000
ceql	0.000	0.000	-2.262	0.025*	0.000	0.000
Year_2013	0.240	0.106	2.272	0.024*	0.031	0.448
Year_2014	0.339	0.104	3.244	0.001**	0.132	0.545
Year_2015	0.300	0.102	2.943	0.004**	0.099	0.502
Year_2016	0.219	0.084	2.605	0.010*	0.053	0.384
Year_2017	0.334	0.093	3.604	0.000**	0.151	0.517
Year_2018	0.368	0.087	4.249	0.000**	0.197	0.539
Year_2019	0.458	0.098	4.688	0.000**	0.265	0.651
Year_2020	0.473	0.117	4.058	0.000**	0.243	0.703
Year_2021	0.538	0.123	4.373	0.000**	0.295	0.781
Year_2022	0.412	0.128	3.207	0.002**	0.158	0.665

Note: Robust standard errors are reported.
* P-value < 0.1
** P-value < 0.05

Table 9. Fixed Effects Model for Sector 45 (DV = Tobin's q)

Dep. Variable	log_tobins_q
No. Observations	284
Log-likelihood	-2.219
R-squared	0.560
R-squared (Between)	-1.882
R-squared (Within)	0.560
R-squared (Overall)	-1.621
F-statistic (Robust)	18.880
P-value	0.000
Durbin-Watson Statistic	1.064

Variables	**Parameter**	**Std. Err.**	**T-stat**	**P-value**	**Lower CI**	**Upper CI**
log_RnD_Intensity	0.505	0.084	6.027	0.000**	0.340	0.670
log_Advertising_Intensity	-0.023	0.088	-0.259	0.796	-0.196	0.151
cogs	0.000	0.000	2.154	0.032*	0.000	0.000
intan	0.000	0.000	-5.915	0.000**	0.000	0.000
invt	0.000	0.000	-5.389	0.000**	0.000	0.000
ch	0.000	0.000	1.923	0.056	0.000	0.000
ceql	0.000	0.000	4.980	0.000**	0.000	0.000
Year_2013	0.048	0.106	0.453	0.651	-0.161	0.257
Year_2014	0.166	0.106	1.560	0.120	-0.044	0.375
Year_2015	0.110	0.102	1.071	0.286	-0.092	0.311
Year_2016	0.295	0.108	2.726	0.007**	0.082	0.508
Year_2017	0.467	0.118	3.976	0.000**	0.236	0.699
Year_2018	0.533	0.113	4.708	0.000**	0.310	0.756
Year_2019	0.661	0.109	6.049	0.000**	0.445	0.876
Year_2020	0.729	0.117	6.223	0.000**	0.498	0.960
Year_2021	0.887	0.113	7.862	0.000**	0.665	1.109
Year_2022	0.621	0.122	5.104	0.000**	0.381	0.860

Note: Robust standard errors are reported.
* P-value < 0.1
** P-value < 0.05

Random Effects Model with Sector and Advertising and R&D Intensity Interactions.

The random effects model for Tobin's q with interaction terms between advertising intensity and sector categories offers a different understanding of how these interactions might influence market valuation (Table 10). With an R-squared of 0.488, the model explains about 48.75% of the variance in Tobin's q, indicating a robust level of explanatory power. The model has a more substantial explanatory power regarding between-firms variance (R-squared Between: 0.861) than within-firms variance (R-squared Within: 0.2866). In addition, the Durbin-Watson statistic of 0.808 points to a low degree of positive autocorrelation in the model's residuals. The interaction terms "adv_intensity_x_45", "adv_intensity_x_35", and "adv_intensity_x_25" have significant positive coefficients, indicating that the impact of advertising intensity on Tobin's q significantly varies across different sectors. This variability highlights the importance of considering sector context in evaluating the effects of advertising on market valuation. The year dummies continue to show significant effects over time.

Table 10. Random Effects Model with Advertising Intensity and Sector Interactions (DV = Tobin's q)

Dep. Variable	log_tobins_q
No. Observations	860
Log-likelihood	-43.575
R-squared	0.488
R-squared (Between)	0.861
R-squared (Within)	0.287
R-squared (Overall)	0.821
F-statistic (Robust)	33.964
P-value	0.000
Durbin-Watson Statistic	0.808
Breusch-Pagan Test	0.000

Variables	**Parameter**	**Std. Err.**	**T-stat**	**P-value**	**Lower CI**	**Upper CI**
log_RnD_Intensity	0.134	0.037	3.667	0.000**	0.062	0.205
log_Advertising_Intensity	-0.259	0.037	-7.004	0.000**	-0.332	-0.187
cogs	0.000	0.000	2.806	0.005**	0.000	0.000
intan	0.000	0.000	-7.015	0.000**	0.000	0.000
invt	0.000	0.000	-3.123	0.002**	0.000	0.000
ch	0.000	0.000	-0.776	0.438	0.000	0.000
ceql	0.000	0.000	0.099	0.921	0.000	0.000
Sector_25	0.015	0.136	0.111	0.912	-0.252	0.282
Sector_35	0.197	0.153	1.291	0.197	-0.103	0.496
Sector_45	-0.008	0.140	-0.061	0.951	-0.284	0.267
Year_2013	0.136	0.043	3.203	0.001**	0.053	0.219
Year_2014	0.200	0.042	4.739	0.000**	0.117	0.282
Year_2015	0.176	0.041	4.254	0.000**	0.095	0.257
Year_2016	0.237	0.039	6.147	0.000**	0.161	0.313

Year_2017	0.340	0.043	7.985	0.000**	0.257	0.424
Year_2018	0.347	0.042	8.250	0.000**	0.264	0.429
Year_2019	0.434	0.045	9.598	0.000**	0.345	0.523
Year_2020	0.487	0.051	9.584	0.000**	0.387	0.587
Year_2021	0.582	0.052	11.116	0.000**	0.479	0.685
Year_2022	0.379	0.053	7.150	0.000**	0.275	0.483
adv_intensity_x_45	12.427	1.476	8.420	0.000**	9.530	15.324
adv_intensity_x_35	15.532	4.276	3.632	0.000**	7.139	23.925
adv_intensity_x_25	11.480	1.792	6.405	0.000**	7.962	14.998

Notes: (1) Sector_20 is the base sector. (2) Robust standard errors are reported.
* P-value < 0.1
** P-value < 0.05

Table 11 reports that the random effects model with the interaction terms explains approximately 47.9% of the variance in Tobin's q (R-squared: 0.479). The interaction terms, `RnD_intensity_x_45`, `RnD_intensity_x_35`, and `RnD_intensity_x_25`, indicate that R&D's effect on Tobin's q significantly varies across sectors, mirroring the sector-specific patterns observed in the model I tested the interaction of advertising intensity and section. Year dummies maintain their significance.

Table 11. Random Effects Model with R&D Intensity and Sector Interactions (DV = Tobin's q)

Dep. Variable	log_tobins_q
No. Observations	860
Log-likelihood	-51.209
R-squared	0.479
R-squared (Between)	0.852
R-squared (Within)	0.278
R-squared (Overall)	0.812
F-statistic (Robust)	29.67
P-value	0.000
Durbin-Watson Statistic	0.779
Breusch-Pagan Test	0.000

Variables	**Parameters**	**Std. Err.**	**T-stat**	**P-value**	**Lower CI**	**Upper CI**
log_RnD_Intensity	-0.146	0.041	-3.61	0.000**	-0.226	-0.067
log_Advertising_Intensity	0.029	0.036	0.803	0.423	-0.042	0.100
cogs	0.000	0.000	2.218	0.027*	0.000	0.000
intan	0.000	0.000	-7.281	0.000**	0.000	0.000

invt	0.000	0.000	-2.84	0.005**	0.000	0.000
ch	0.000	0.000	-0.87	0.385	0.000	0.000
ceql	0.000	0.000	0.279	0.781	0.000	0.000
Sector_25	0.182	0.130	1.401	0.162	-0.073	0.436
Sector_35	0.554	0.147	3.781	0.000**	0.266	0.842
Sector_45	0.283	0.140	2.021	0.044*	0.008	0.558
Year_2013	0.132	0.043	3.089	0.002**	0.048	0.216
Year_2014	0.198	0.042	4.719	0.000**	0.116	0.281
Year_2015	0.172	0.041	4.218	0.000**	0.092	0.252
Year_2016	0.224	0.039	5.741	0.000**	0.148	0.301
Year_2017	0.330	0.043	7.650	0.000**	0.245	0.414
Year_2018	0.351	0.042	8.414	0.000**	0.269	0.432
Year_2019	0.438	0.045	9.743	0.000**	0.350	0.527
Year_2020	0.474	0.050	9.402	0.000**	0.375	0.573
Year_2021	0.582	0.052	11.237	0.000**	0.480	0.684
Year_2022	0.388	0.052	7.456	0.000**	0.286	0.490
RnD_intensity_x_45	3.977	0.865	4.598	0.000**	2.279	5.674
RnD_intensity_x_35	2.681	0.797	3.365	0.001**	1.117	4.245
RnD_intensity_x_25	4.593	1.383	3.321	0.001**	1.878	7.307

Notes: (1) Sector_20 is the base sector. (2) Robust standard errors are reported.
* P-value < 0.1
** P-value < 0.05

Skewness and Kurtosis Tests. The skewness and kurtosis values of Model 1's residuals (Fixed Effects Model with Tobin's q) show that they're not perfectly aligned with a normal distribution. A skewness value of 0.183 implies a slight asymmetry, but it's still within the range considered symmetrical. The kurtosis value of 4.359 is higher than what's typical for a normal distribution, indicating residuals have more pronounced tails and a sharper peak at the center. This suggests that extreme values are more common than in a normal distribution, which could impact certain statistical conclusions drawn from the model.

For Model 2 (Fixed Effects Model with Net Income), the skewness and kurtosis of the residuals, -2.149 and 10.676, respectively, reveal significant deviations from a normal distribution. The negative skewness indicates a leftward asymmetry, suggesting that the model often underpredicts, with a longer tail on the left side of the distribution. On the other hand, the high kurtosis value points to a leptokurtic distribution characterized by a sharper peak and fatter tails than a normal distribution. This implies that extreme high and low values are more prevalent, raising concerns about the likelihood of outliers.

The skewness and kurtosis values of Model 3's residuals (Random Effects Model (DV = Tobin's q), at 0.3239 and 3.6245, respectively, indicate a slightly non-normal distribution. The skewness value, close to zero, indicates minimal asymmetry in the residuals, suggesting they are symmetric. The kurtosis value, slightly above the normal distribution's standard of 3, shows a modestly more pronounced peak and somewhat heavier tails. This deviation is not significant enough to raise major concerns about the normality of the data. While these statistics reveal slight deviations from the ideal normal distribution, they are within an acceptable range.

For Model 4 (Random Effects Model with Net Income), the skewness and kurtosis values of the residuals, -2.769 and 11.577, respectively, indicate a substantial deviation from a normal distribution. The skewness value, at -2.769, signifies a pronounced leftward (negative) asymmetry. This suggests that model residuals predominantly lean towards underpredictions, with more frequent or severe underestimations than overestimations, as indicated by the longer tail on the left side of the distribution. The kurtosis value of 11.577, which is significantly higher than the normal kurtosis of 3, points to a leptokurtic distribution.

Variance Inflation Factors (VIFs). As Table 12 reports, most VIF values are well below this threshold, suggesting multicollinearity is not a major concern. The variables "log_RnD_Intensity" and "log_Advertising_Intensity" show moderate VIF values, indicating some degree of correlation but not enough to significantly skew the model. The control variables "cogs," "intan," "invt," and "ceql" have slightly higher VIFs, pointing to a moderate level of multicollinearity. Sector and year dummy variables have relatively low VIF values, indicating they are not highly correlated with other variables in the model. These VIF values suggest that while some multicollinearity is present, it is within acceptable limits.

Table 12. VIF Analysis

Variables	Variance Inflation Factor
const	100.349
log_RnD_Intensity	2.112
log_Advertising_Intensity	1.277
cogs	4.234
intan	2.445
invt	4.281
ch	2.425
ceql	3.037
Sector_25	2.394
Sector_35	2.523
Sector_45	3.088
Year_2013	2.108
Year_2014	2.095
Year_2015	2.071
Year_2016	2.034
Year_2017	2.047
Year_2018	2.063
Year_2019	2.048
Year_2020	2.075
Year_2021	2.062
Year_2022	1.903

Discussion

Summary of Findings

The fixed and random models estimated for both dependent variables (i.e., Tobin's q and net income) indicated some interested findings. As Table 13 reports, support for the hypotheses varies considerably depending on the two dependent variables and whether the estimated model is fixed or random.

Table 13. Summary of Findings

	Fixed Effects Model		Random Effects Model	
Variables	Tobin's q (Model 1)	Net Income (Model 2)	Tobin's q (Model 3)	Net Income (Model 4)
Advertising Intensity	significant and positive effect **H1a: supported**	not significant **H2a: no support**	significant but negative effect **H1a: no support**	not significant **H2a: no support**
R&D Intensity	significant and positive effect **H1b: supported**	significant but negative effect **H2b: no support**	not significant **H1b: no support**	significant but negative effect **H2b: no support**

Results from the fixed effects model show that advertising and R&D intensity are significantly related to firms' market valuation (i.e., Tobin's q). Hence, both H1a and H1b are supported. However, while the effect of advertising intensity on net income is insignificant, the effect of R&D intensity on net income is negative, although statistically significant. In other words, R&D intensity causes a decrease in net income. As a result, neither H2a nor H2b is supported.

As Table 13 reports, the results of the random effects model do not yield significant results for either dependent variable. As I discussed before, it can be concluded that the results obtained from estimating the models with fixed effects modeling give more meaningful results for the existing data set and the constructed model.

Additional analyses using fixed and random effects models across various industries provide more detailed information about how advertising and R&D intensity affect Tobin's q. The fixed effects model highlights the unique industry-specific dynamics affecting company valuation. For example, the significant effect of R&D intensity on Tobin's q in the context of the information technology sector would be seen only in the communication technologies sector, which is somewhat expected but also an interesting finding. Nevertheless, the insignificant effect of advertising intensity on Tobin's q in the same industry highlights that firms in this sector prioritize R&D investments more than advertising. Additionally, the importance of year dummies in these models indicates the impact of time-sensitive factors, such as economic trends and market conditions, on company valuations.

In contrast, random effects models provide a broader perspective, capturing the variance in Tobin’s q across different sectors. These models demonstrate substantial explanatory power, with their R-squared values indicating that they account for a significant portion of the variance in Tobin’s q. Overall, these models suggest that R&D and advertising intensity are related significantly to Tobin’s q across these sectors.

Implications

The study's investigation of the influence of advertising and R&D intensity on firm performance, such as market valuation and net income, is critical for understanding how firms might utilize their internal resources and strategic priorities to acquire a market competitive advantage. The study replicates previous results and goes beyond past research by studying the effects of these investments in tandem, providing a more comprehensive view of how a balanced approach to value creation (i.e., R&D investments) and value appropriation (i.e., advertising investments) might improve a firm's performance. This study is especially relevant in today's volatile business environment when organizations must adapt and strategically manage resources to maintain market presence, growth, and profitability.

Based on the RBV propositions, I argue that companies will invest in R&D and advertising to increase their competitive advantage and achieve superior performance. However, this effect varies depending on how firm performance is measured. For instance, the results of this study indicate that although both advertising and R&D investments have a positive effect on company valuation (i.e., Tobin’s q), they do not have a statistically significant effect on net income and may even cause a decrease in net income. In other words, it turns out that RBV's propositions will differ depending on how performance is defined and measured.

In the light of the findings, it is possible to draw the following conclusions:

1. The impact of advertising and R&D intensity on firm performance is not uniform across performance measures. The direction and significance level of the effect varies greatly depending on the performance variable used.
2. The direct effect of advertising and R&D intensity on firm performance is observed in fixed effects modeling, but random effects modeling is insufficient to reveal significant direct effects.
3. It is necessary to examine in detail how the effects of both advertising and R&D intensity on performance differ between sectors. Indeed, random effects modeling captures variations across sectors more effectively.

Limitations and Future Research

As with every study, this study has some limitations. First, although Compustat is an extensive and widely used database, it has some limitations. Business financial records in the database are subject to regular adjustments due to corrections or revisions. International firms' data quality and consistency can be compromised by the different regulatory environments in which they operate. Additionally, it does not include essential data from large private organizations. There is also a disparity in data detail, with information on relatively small or international firms being less comprehensive than on larger firms.

Second, the data on the dependent and independent variables I used in this study were not available for every company in Compustat. For this reason, the number of companies included in the data set remained relatively small. Testing the model, I proposed in this study with a larger sample will allow the results to be better generalized.

Third, due to missing data, I could not control for variables related to firm (i.e., firm age and firm size) and industry (i.e., market dynamism) characteristics. It may be necessary to retest the model by adding additional control variables to investigate the robustness of the results I obtained.

Fourth, I focused on two performance variables in this study: market valuation and net income. However, many different variables can be used to measure firm performance. The model in this study may need to be tested on different performance measures.

Finally, since I could not obtain the required number of instrumental variables that satisfies the criteria of theoretical relevance and exclusion restriction to account for endogeneity bias in model predictions, retesting the models by controlling for endogeneity bias may be necessary to confirm the validity of the results.

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