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How does brand equity, an intangible asset, impact a firm's performance?

Through accounting and market-based measures

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ABSTRACT

This paper focuses on how brand value can affect a firm's performance. I used brand value estimations from Brand Finance of the top 100 firms to study this. I focused on accounting and market measures to investigate their effect on performance. After using panel regressions, I found a robust statistical relationship between brand value and accounting measures. However, this effect was less direct for the market measures.

These findings show the benefits of investing in brand equity. We learn that investing in brand value can strongly affect firms' revenue and market capitalisation; however, I cannot reject the hypothesis that it has no effect on stock returns from my main methods employed.

Keywords: brand value, firm performance, accounting measures, market measure.

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CHAPTER 1 Introduction

A recent survey in the US found that the main driver for consumer purchases was the trust and loyalty people had towards a given brand (Feger, 2023). Unsurprisingly, brand name plays a vital part in a firm's success and is an essential driver for sales. This relationship is seen not only in consumer behaviour but also in the financial sector with the brand licensing market. Brand licensing lets companies sell the use of their image, name, or other intangible asset to other firms. This market is expected to reach a total value of 400 billion USD by 2030 (Adroit Market Research, 2024), showing the growing strength brand names can have. These observations indicate that brand equity has a profound consequence on a firm's financial performance and its ability to generate a profit, as well as on its market value, which arises from the perceived value of its equity.

An abundance of past research examines the effect of a firm's assets on the firm performance and value. Indeed, many managers and investors need this information to make better decisions. However, firms comprise many tangible assets, such as cash, properties and equipment, and intangible assets, such as intelligence, culture, and brand equity. These intangible assets are, by nature, more complex to study, as they are unobservable, meaning research needs to rely on approximations or proxies. The research on those intangibles' effect on financial performance and value finds a positive correlation. For example, the study from Haji & Mohd Ghazali (2018) finds a strong positive impact of firms' intangible assets on their performance while investigating Malaysian firms. Intangible assets were measured as the difference between firms' book and market values. However, various categories of intangible assets exist, and a more extensive list of proxies can be used to investigate each. Looking at the effect of each intangible asset and its relationship with firms' performance and value takes considerable effort and time—the study by Chen et al. (2005) examined this relationship with a firm's intellectual capital. They use the VAIC (Value Added Intellectual Coefficient) as their proxy and use regression models to find the effect on a firm market-to-book value ratio. Research from Lev et al. (2009) investigated firms' organisational capital and the firms' ability to save costs and generate higher-than-normal profits. The studies of Edmans (2011) and the paper of Barnes & Cheng (2023) looked at the effect of employee satisfaction. The latter used survey information about employee CEO satisfaction to explore the impact on stock returns and firm performance.

In the paper of Lev (2000), intangible assets are divided into four main categories. From the previously cited literature, we see studies focusing on the discovery intangibles (intellectual assets), human resources (employee satisfaction) and organisational capital (cost saving and structure). The last intangible, customer-related intangibles, has been rising in importance, with brand names and customer loyalty becoming increasingly important. My study will follow the general approach used by Barnes & Cheng (2023) whilst investigating brand equity and its effects instead of CEO employee approval rates.

I aim to show that the previous results, mainly the positive impact of intangible assets on a firm's performance and stock market return, can be extended to another intangible, brand equity. I will address these issues by answering the following research question: "**How does brand equity impact a firm's performance and market value?"**

The primary research method will be unbalanced panel data regression models. This paper is interested in three dependent variables: Net Sales, Market-to-Book Ratio, and Stock Return. Other tests, such as the Granger causality, will also be used. The brand equity data will comprise the top 100 companies in brand equity each year from 2007 to 2023. This data is from a consultancy firm, Brand Finance. Brand Finance uses a mixture of surveys and personal knowledge to calculate brand equity (see Appendix A). Using estimated values instead of proxies allows me to leverage the knowledge acquired by consultancy firms to value this asset while avoiding the added errors of using proxies. A company ID must be attached to each observation using company identifiers from CRSP through WRDS. Net Sales will be used for performance, and the Stock Return and Market-to-Book Ratio will be used for the firm market performance. This data will be retrieved from DataStream. Other control variables will be added to each regression. The principal SIC codes will account for industry-specific effects and standards. Other financial components that could affect a firm's valuations and performance will also be added.

Brand equity is a driving force for consumer behaviour. Moreover, in competitive markets, this makes it a competitive advantage. This would lead me to believe that brand equity positively affects a firm's performance and sales. For the second part of the question, we need to examine if this asset is considered by investors when valuing a firm. In a perfect and efficient market, all assets would be reflected somewhat in a firm's value. However, as many papers illustrate, the assumption of a perfect market does not hold. It is possible that brand equity has an indirect effect through sales (consumers) and no statistically significant causal effect on a firm's value. Therefore, I expect to see a reduced positive impact of brand equity on a firm's value when sales and other control variables are added to the models. Understanding the direction and magnitude of brand equity's effect will give us insight into its importance for firms and help us better understand how to incorporate it in firm valuations.

My paper finds a strong relationship between brand value and a firm's revenue and market value. However, this effect does not seem always evident for a firm's stock return. These findings showcase the importance of brand value on customers, driving up sales, and on investors, who seem to account for brand value when valuing firms.

In the first part of the paper, I will review the research on the different topics and relationships present here: firm performance measures, brand value, and their relationship. I will then review the data

and methods I will use to conduct my research. Finally, in the last part, I will discuss my results and their implications, including the limitations and conclusion of my study.

CHAPTER 2 Theoretical Framework

2.1. Firm Financial Performance

2.1.1. Accounting Based Performance Measures

To examine a firm's financial performance, a multifaceted term, we must decide on a few proxies to help us get a clear picture. I will first start by using accounting-based performance measures. Masa'deh et al. (2015) defined this topic in their research.

> "For instance, public companies are required to disclose in their financial statements […]. In addition, analysts use a well-known technique in analysing the figures taken from company financial statements: ratio analysis. The major purposes of the analysis of ratios can be summarised as ascertaining the performance of the company, determining its financial strength, and using them for comparative purposes."(Masa'deh et al., 2015)

Their research focuses on the firm's Information technology investments and their impact on its performance. They examine the different metrics (proxies) used for firm performance in similar papers. Some of the proxies for firm performance discussed are accounting (profitability) ratios, such as return on investments, sales, and capital employed. Accounting-based performance measures are one way for researchers to evaluate the profitability and efficiency of firms and compare them with each other.

One of the earliest studies, (Foulke, 1950), examined the early beginnings of financial analysis and its history. In the third part of this book, a few ratios are studied individually, including current assets to current liability, current liabilities to tangible net worth, and funded debt to net working capital. This work helps encompass the general conventions behind financial statements and how best to interpret them when information is more challenging to come by and verify. Here, ratios were used to judge the creditworthiness of firms (starting from the late 19th century). The paper from Altman (1968), a seminal paper on the usefulness of accounting measures, uses a predictive model in the form of multiple discriminant analysis. This allows various ratios to be used simultaneously to determine a firm's potential bankruptcy. The final model includes ratios such as Working Capital/Total Asset, Retained Earnings/Total Asset, and Sales/Total Assets. This method gives each publicly held firm a Z-score, which is statistically different on average for companies that will experience financial distress in the near future. The model was able to predict bankruptcy for 95% of the sample. The groundwork and technique used by Altman gained much recognition and was studied heavily in subsequent papers.

These papers, among many others, show the real-world usefulness of accounting ratios in measuring a firm's performance. However, accounting ratios also have downsides, the main one being that they are backward-looking. Indeed, all ratios and accounting information use the performance firms

experienced in the last business schedule. Having a forward-looking (the prospect of the firm) measure could be very useful as an additional measure of a firm's performance (Kapopoulos & Lazaretou, 2007).

2.1.2 Market Based Performance Measures

The second financial measure that can be used to evaluate a firm's performance is market values and ratios. These take advantage of stock market information. The definition can be found in the paper by Al-Matari et al.(2014).

> "The market-based measurement is characterised by its forward-looking aspect and its reflection of the shareholders' expectations concerning the firm's future performance, which has its basis on previous or current performance. (Al-Matari et al., 2014)".

Market-based information differs from accounting-based measures in two distinct ways: the time dimension and the information they encompass. Firstly, market measures are forward-looking, as they are predictions from the investor community. Secondly, they encompass more information, such as the firm's non-financial assets and other aspects that can change its valuation and the sentiments of the markets and investors (Demsetz & Villalonga, 2001).

One of the earliest studies to show the importance and usefulness of such measures is Graham's 1949 paper on value investing (Graham, 2000). Value investing is based on the central assumption that some stocks are undervalued. Therefore, by calculating a firm's value, an investor can invest in underpriced firms, using Earnings per Share as one of the fundamentals. Thanks to value investing, investors can make a profit. Warren Buffet has repeatedly stated that this is his investing strategy and viewpoint (*Three Timeless Investment Lessons from Warren Buffetts Annual Letter*, n.d.). Much like we saw previously with accounting ratios, many market ratios are also used to predict business success. In the paper of Ansoff et al. (1970), they use market ratios as proxies of firm performance for the outcome variable. They find that firms that plan for acquisition perform better on those "objective" metrics after the acquisition than those that do not. A recent paper from Bawa (2019) states that the most popular performance measures include a mixture of accounting and market measures: sales growth, earnings per share, profitability ratios and market-to-book ratios, stock market return, and Tobin's Q.

2.2 Intangible Asset – Brand Equity

Firms are composed of two types of assets: tangible and intangible. The latter includes social performance, strategic performance, and stakeholder engagement. Intangible assets are also much more challenging to measure and quantify, making their study more difficult. In the book *Intangibles: Management, Measurement, and Reporting*, Lev (2000) explores and defines intangible assets.

> "Assets are claims to future benefits, such as the rents generated by commercial property […]. An intangible asset is a claim to future benefits that does not have a physical or financial (a stock or a bond) embodiment. A patent, a brand, and a unique organisational structure […]" (Lev, 2000).

The book explores the recent growth of intangible assets. As technology firms started growing, their main value was in the form of intangibles.

Coase (1937) is one of the earliest works on intangibles. The paper tries to define what a firm is to provide a more rounded definition and understanding. He mentions "knowledge" and how it could lead to higher income. Today, this would be considered an intangible asset. Other early works focused on the accounting of intangible assets under the account "Goodwill". The paper from Owens (1923) goes through the legal and accounting definition of goodwill, the acquisition of it through marketing and other sources, and how to properly value it. In accounting, it is managed as a real asset. However, it is noted that it is often used to cover mistakes and mismanagement of the firms, making it an unreliable proxy for the total intangible assets of firms. Seminal studies include the work of Kaplan & Norton (1992) and Griliches (1979) . The former created the balanced scoreboard, a framework for companies to understand and apply all the different intangible assets owned by firms. The latter study examines the effect of R&D investments on firm productivity growth.

Intangible assets can be divided into many categories (Lev, 2000). Past papers have explored how to measure and value each one and their relative impact on firms. Firstly, regarding organisational capital, we have a paper by Lev et al. (2009) that looks at the effect of organisational capital on sales growth, stock returns, and executive compensation. They find a robust positive impact on the next five years of operation. Secondly, for human resource intangibles and learning intangibles, (Bontis et al., 1999) evaluate the current ways proposed to measure intangibles, such as human resources and intellectual capital. Finally, customer-related intangibles, including brand equity, are my main interest in this paper. I dive into more detail about brand equity in the next section.

2.2.1. Brand Equity

Brand equity refers to the added value and increased loyalty a firm can experience thanks to its brand (Wood, 2000). As the former paper discusses, what exactly qualifies as brand equity is up for debate. Many definitions are discussed between the brand image, strength or an asset with a given value. Brand equity is vital in firms' operations, including their logos, customer loyalty, brand image, trust, and many more aspects.

Early seminal studies from Keller (1993) and Aaker (1996) worked on defining brand equity. In the work of Keller (1993), he defines brand equity as the customer being aware of the brand and haven a positive relation to it. His study conceptualises, explains, and explores the different ways to manage, measure and create brand equity (Appendix A). The work from Aaker (1996) focused on how to calculate this intangible. He provides ten different possible ways to measure aspects of brand equity. These include price premium, brand awareness, and market share. Each component comes with a certain number of assumptions and difficulties. Both studies helped propel the importance of brand equity for firms. By conceptualising and defining ways to measure brand equity, they inspired more research and studies on this topic.

Many studies focus on measuring brand equity, a task by itself. The paper from Isberg & Pitta (2013) uses the return on equity and return on assets to measure brand equity. By doing so, they can investigate the effectiveness of different marketing strategies. However, they assume that brand equity will be reflected in the market. This follows the theory of an efficient market, which is still debated. They found that the brand strategies were more effective for firm performance than acquisition strategies for the specific firm evaluated. Research from Keller & Brexendorf (2019) and Leuthesser et al. (1995) explore different ways to measure brand equity. The latter study focused on the halo measurement. The halo effect is the distortion of the ratings of characteristics based on the opinion of the entire product. Here, the researcher takes advantage of this measurement error by interpreting it as brand equity. Finally, the research from Park & Srinivasan (1994) and Lassar et al. (1995) use surveys which question different aspects of the brand to evaluate brand equity. Other studies focused more heavily on the potential benefits of brand value. Rangaswamy et al. (1993) looked at the extendibility of brand value. Indeed, having high brand value could lead to the firm being able to extend its offerings. They developed a model that can provide information on how a brand should market and generate its brand equity to have further reaching extendibility.

Thanks to research on ways to measure brand equity, researchers can also investigate the different impacts brand equity can have on a firm and its possible benefits. My paper will explore the relationship between brand equity and firm financial performance.

2.3 Relationship between Brand Equity and Firm Performance

My research will focus on the relationship between brand equity and its effect on firm performance, measured through financial measures, including accounting and market measurements. Similar relationships were studied in past papers, and they can help guide our expectations.

> “brand equity will usually provide higher margins for products by permitting premium pricing.” (Aaker, 1992).
>
> “Strong brand names create stronger cash flows and stronger earnings, which in turn creates stronger values for shareholders"(Yovovich, 1988).

The definitions above explain how brand equity could make firms more profitable, have higher margins and increase their value.

Past research has investigated this identical relationship—the study from Kim et al. (2003) looked into the impact of brand equity on 12 luxury hotel chains. They used 513 surveys from individuals who have stayed in luxury hotels in the last two years. The study used sales as the performance measurement. This isolates the effect of customers purchasing from the brand without considering the companies' managerial effectiveness and efficiency. Using a nonparametric correlation method, they found a strong relationship with firm performance. The research from Hsu et al. (2013) uses the data from Interbrand to see if their estimation of brand equity in the top 100 firms impacts those firms' market performance. They looked at the market returns of these firms compared to the S&P 500 and found strong abnormal returns for the brands in the top 100 between 2001 and 2010. The research from Kerin & Sethuraman (1998) was one of the first studies to explore the statistical relationship between the brand and its market-based performance. They used the market-to-book ratio as their proxy for firm performance and the brand value provided by Financial World Magazine for its estimation. They found a concave relationship between the two variables. They also use the Total Sales as a control variable that might mediate the effect of brand value, where they still find a positive effect of brand value on firm performance.

Other research was done with similar relationships in mind. Here, instead of brand value, other intangibles are explored. The study by Chen et al. (2005) investigated the relationship between intellectual assets and firm performance. They find a positive impact using the market-to-book ratio for firms’ performance. S. Barnes & Cheng (2023) explore the relationship between the employee’s satisfaction with their CEO and the firm performance. They used data obtained from Glassdoor between 2013 and 2018. They find that those firms experience excess stock returns and have increased returns on assets. Based on past research on my relationship of interest, two main hypotheses can be proposed.

H1: Brand Value positively affects the firm’s accounting-based performance measure.

H2: Brand Value positively affects the firm’s market-based performance measure, even after moderating with Net Sales.

CHAPTER 3 Data

Based on the past papers, we see that researchers are presented with many options when studying the effect of brand value. The choices of those variables, timeframes, and measures could affect that relationship. Therefore, my paper aims to further complete past research by presenting a new sample, timeframe, variable mix, and different methodologies. This research relies on a sample of 175 firms from 2007 to 2023, with 1520 observations. This data is collected through the website Brand Finance, which publishes an annual report on the top 500 global brands (*Home | Brand Finance*, n.d.). The sample comprises the top 100 firms regarding brand equity; however, some adjustments had to be made before starting the analysis. Only publicly held companies were kept in the sample, which was required for the market information. Another issue was firms' owning multiple brands. In this case, the sum of the values was taken, for example, Instagram and Facebook being under the company META. Lastly, some companies only became public a few years after appearing on these charts; those observations were deleted in this case. All other data was extracted from DataStream, using each company's ISIN code as an identifier for the outcome and control variables.

Predictor variables

Firstly, we have the predictor variable, **Brand Value**. The company Brand Finance estimates brand equity/value using brand impact, strength, and forecasts. Brand royalty agreements and acquiring brands help them find a benchmark of how brands are priced on the market. They then add the performance and brand strength to get a more accurate result (Appendix A). For the causal inference of my paper, it is essential to note that these values are published in the first quarter of each year, whilst my outcome variables, described below, are taken at the end of each year. This helps establish temporal precedence without using lags of brand value.

Outcome variables

Net Sales are taken for accounting-based measures. They are a balance sheet item representing all the revenue from goods and services sold. This variable lets us see how much people consume of this brand. Compared to other items that are lower on the balance sheet (e.g., profits, EBITDA), net sales should reflect less on how well and efficiently the management and firm are and, therefore, more on customer demand. **Market to Book Ratio** and **Stock Return** are taken for the market-based measures. We use the Book Value of common equity and Market Capitalisation variables to calculate the Market to Book Ratio. The book value is the firm’s assets minus its liabilities, giving us the price of the tangible parts of the company. The market capitalisation is the sum of all its outstanding shares, showing how much the company, in its totality, is worth, including, in theory, both the tangible and intangible parts of firms. By dividing the market capitalisation by the book value, we get a ratio that tells us if investors

believe the company is worth more than its book value. Finally, the Stock Return variable helps us understand how the market sees the firm and how this changes every year.

Control variables.

Finally, for my control variables, I chose relevant variables correlated with both the outcome and predictor variables while being independent, where the predictor variable, brand equity, does not cause its variation (Spector & Brannick, 2011). All control variables are obtained thanks to DataStream. Our first control variable, used as a proxy for firm size, is **Employees.** It considers the number of both full-time and part-time employees. Another control variable, **Total Asset**, is also used as a proxy for size and can explain some of the dependent variables. It is taken yearly and expressed in US dollars. It equals the sum of all the firm's assets (current, receivables, other investments). Our third control variable, **Industry Code (SIC)**, separates the impact of different industries. This categorical variable takes values 1 to 6 for the following sectors, respectively: industrial, utility, transportation, bank/savings and loans, insurance, and other financials. Our Fourth control variable**, Global**, takes the value of 0 for North American companies and 1 for the rest of the world. Finally, **Sales Growth** is expressed in percentages and shows the increase in sales from one year to the next. This helps us see how much the business grows each year.

Table 1. Summary Statistics

	Observations	Mean	Standard Deviation	Min	Max
Brand Value	1520	28595	30794	6344	355080
Net Sales	1520	105831	92886	70	648125
Sales Growth (%)	1520	7.11	20.81	(52)	545
Stock Return (%)	1520	7.62	33.42	(85)	284
Market Cap.	1520	154487	234713	141	2697384
Book Value	1520	68775	70073	(60672)	481469
Market to Book Ratio	1520	4.47	29.28	(269)	590
Employee	1520	214308	256472	29	2300000
Global	1520	0.52	0.50	0	1
Total Assets	1520	510457	884925	317	6415913
SIC – 1	962				
SIC – 2	182				
SIC – 3	37				
SIC – 4	237				
SIC – 5	65				

SIC – 6	37
Year – 2007	87
Year – 2008	91
Year – 2009	90
Year – 2010	93
Year – 2011	94
Year – 2012	93
Year – 2013	93
Year – 2014	92
Year – 2015	89
Year – 2016	89
Year – 2017	88
Year – 2018	84
Year – 2019	87
Year – 2020	88
Year – 2021	88
Year – 2022	87
Year – 2023	87

Note. All data is expressed in Millions and US dollars, except employees expressed in ones.

CHAPTER 4 Method

After retrieving and organising the variables used in this paper, we can discuss the methodology employed. Here, I will outline the primary econometrics tool used and, in the next section, the results from those tests. All the tests aim to provide a transparent and clear understanding of my sample and the relationship studied and answer the main research question: **"How does brand equity impact a firm's performance and market value?"**

Here, I have three main regressions of interest to verify the effects of brand equity on accounting and market-based performance:

$$(1) Net\ Sales_i = \beta_0 + \beta_1\ Brand\ Value_i + \beta_2\ \boldsymbol{Control\ Variables_i} + \ \varepsilon_i$$

$$(2)\quad Market\ to\ Book\ Ratio_i = \beta_0 + \beta_1 Brand\ Value_i + \beta_2 \boldsymbol{Control\ Variables_i} + \ \varepsilon_i$$

$$(3)\quad Stock\ Return_i = \beta_0 + \beta_1 Brand\ Value_i + \beta_2 \boldsymbol{Control\ Variables_i} + \ \varepsilon_i$$

Each equation shown above can have a variety of control variables added. However, to make reliable predictions, it is essential only to include variables that benefit the regressions. I used theoretical reasoning (see data section) for each equation to decide which variable was most appropriate. Control variables for equation (1) include Employee, Industry codes, Global, Total Assets, and Sales Growth. However, Net Sale is also added for equations (2) and (3).

Considering the nature of my data, using fixed-effect panel regression models will be most appropriate here, as each firm has characteristics that go beyond the control variables in my equations. However, for regressions to be unbiased, consistent, and efficient, we need the underlying assumptions of regressions to hold. To help with this crucial part of the paper, I used the work from Brooks (2019) to check all the necessary assumptions and to help apply the theory in statistical software. I will use a statistical significance level of 5% as it is the most used in the scientific discipline and will, therefore, make comparisons between papers simpler.

4.1. Assumptions

Firstly, I verify that none of the variables in my dataset suffer from **multicollinearity**. I have no reason to assume it would be an issue, as all variables represent and measure different constructs. Still, a collinearity table is performed to verify this assumption formally.

Secondly, given its name, OLS regression assumes a **linear functional form** between the variables. However, some of the relations investigated in the three equations above may not follow a linear one. This issue can be challenging to assume in advance, so I rely on a series of histograms (Appendix B), scatterplots (Appendix C), and a test (Ramsey Reset test, Percentile table). This can help guide any required transformations.

Thirdly, seeing the significant variations between firms, I test for the **normality of residuals** using the skewness and kurtosis test (a variation of the Jarque-Bera test) and visual histograms in Appendix D.

Fourthly, I have been investigating the relationship between firms over time, so the **autocorrelation** issue can be pretty significant. Indeed, it is relatively easy to imagine that a firm's performance is linked to last year's performance. A Woolridge test is applied to test this assumption formally (Wooldridge, 2010).

Given the sample of my data and looking at the descriptive statistics, we notice some large standard deviations, which could suggest a problem of **heteroskedasticity**. A Breusch Pagan/Cook Weisberg test is performed and given the earlier results from the Jarque-Bera Test; two other versions of this test that drop the normality distribution assumption are performed.

Finally, there is the assumption of **endogeneity**, which has become one of the most critical assumptions for OLS regressions as it could lead to bias and inconsistent estimators. This problem occurs when my independent variable, brand value, is correlated with the error term. Another hurdle with this last assumption is its difficulty in testing for it and, therefore, relying on intuition and theory. Some issues arise from omitted variables, which can be a big issue in many regressions; however, adding the previously suggested control variables could help alleviate it. I will also use fixed-effect models, eliminating the issues caused by time-invariant characteristics. Sample bias could also be an issue if the results are applied to firms not represented in the sample. Due to the nature of my sample, it is essential to understand that the results apply to big multinational firms. Lastly, there can be the issue of reverse causality, which can be directly noticed in Appendix A. Indeed, brand value is directly measured using partly the future sales of the firms. Many solutions exist; however, each comes with its downfall. A fixed-effect regression already helps alleviate some exogeneity issues in pooled OLS regressions. To explore this issue further, the robustness section will add other models with varying assumptions.

4.2. Regressions

Based on the results of the assumptions, I will need to use cluster standard errors when performing regressions. This can help with heteroskedasticity and autocorrelation within firms. Here, clustering by firm is appropriate, as each firm varies drastically in its operations, size, and conditions. An ICC test is also performed to verify this belief.

The data collected is under a panel form, with the company's ISIN as the time-invariant variable and year as our time indicator variable. Here, using the panel information when regressing can make our results much more reliable by making more of the OLS assumptions hold and, most importantly, reducing some of the issues that arise with the assumption of endogeneity. Indeed, panel regressions can remove time-invariant and unobservable omitted variable bias and have become widely used in research. Two main panel regression types are fixed effects and random effects. A fixed-effects model allows each firm to have its intercept while keeping the slope of the effects identical. Random-effects models assume that the unobserved firm-specific effects are not correlated with my explanatory variables. However, it does seem that different firms can have many characteristics that break this assumption, such as the firm's culture, efficiency, and pace of innovation. Therefore, using fixed-effect unbalanced panel regressions as the central methodology to investigate the relationships between brand value and firm performance (Borenstein et al., 2010) seems more appropriate and intuitive for all three equations above.

4.3. Robustness

However, using such a technique also has some downsides, mainly time-invariant variables of the dataset dropout. A Breusch Pagan LM test and a Hausman Test are performed to see if other models between a pooled OLS, FE, or RE could be appropriate.

Due to the potential threat of reverse causality, I also want to provide some additional methods that are more robust to this issue. The work of Leszczensky & Wolbring (2019) suggests using a cross-lagged panel model with fixed effects, which uses maximum likelihood utilizing structural equation modeling. As brand values are already taken at the beginning of the year, compared to the firm performance, including its lag is not necessary in my case. Therefore, I will perform a dynamic panel regression with a fixed effect, which includes a lag of my dependent variables. This test will help us see my previous reletioships under different assumptions.

Finally, a Granger causality test will also be performed. Here, only balanced panel data can be used with such a test. Therefore, my data will use a subsample of all the firms present between 2007 and 2023 (Dumitrescu & Hurlin, 2012). 942 observations are lost, which provides a sample of 34 firms. This low number shows the ever-changing ranks of brand value. Out of the top 100 firms from 2007 to 2023, only 34% of them stayed in this sample every single year. This could be explained by the changes in technology, consumer spending, and overall trends in the years this study examines. It is, however, one of the limitations of this study, which is discussed more in-depth in Chapter 7.

CHAPTER 5 Results

After establishing the steps in the previous section, I will report all the findings from the assumption testing, regressions, and robustness checks in this section. Each test is performed, and the outputs are explained. The implications of these tests will be discussed in the next section, Chapter 6, Discussion.

5.1. Assumptions

Table 2. Collinearity Table – Continuous Variables

	Net Sales	Market to Book	Stock Return	Brand Value	Employee	Total Assets	Sales Growth
Net Sales	1.00						
Market to Book Ratio	-0.01	1.00					
Stock Return	-0.02	0.05	1.00				
Brand Value	0.41	0.04	0.05	1.00			
Employee	0.57	0.00	-0.03	0.25	1.00		
Total Assets	0.13	-0.06	-0.07	0.07	0.09	1.00	
Sales Growth	0.01	0.02	0.27	0.10	-0.07	-0.04	1.00

The highest correlation is between the number of employees and net sales, with 0.57. This makes sense as larger companies can have more significant revenues. We also see a very low correlation between the chosen dependent variables. This can benefit my research as it means they all capture different, uncorrelated aspects of performance. As all these correlations are below 0.8, I do not have to worry about multicollinearity in my data. We can also notice how brand value has a relatively strong correlation to Net Sales. However, this is different from the other two dependent variables.

Table 3. Market to Book Ratio Percentiles

Percentile	Centile
1	(29.60)
2	(18.97)
5	0.45
95	11.37
98	17.69
99	40.39

Note. The Market-to-Book Ratio is the Market Capitalization of firms divided by their Book Value.

After examining the lack of multicollinearity, I can focus on the distributions of variables. Based on the table above, it could be appropriate to winsorise the market-to-book ratio to the 2nd and 98th percentiles, as significant outliers exist on both extremes of this variable. The graphs in Appendix B show that variables such as Net Sales, Brand Value, Stock Returns are very skewed, and the logarithm

of those variables might be appropriate. The Ramsey Rests test below will explore possible transformations with these variables.

Table 4. Ransey Rest Test

	Transformations	F-value	P-Value	Adjusted R2
Net Sales		0.36	0.70	0.47
Net Sales	Brand Value (log)	6.08	0.00	0.46
Net Sales	Brand Value (log) Net Sales (log)	59.77	0.00	0.29
Market to Book		1.09	0.35	0.01
Market to Book	Brand Value (log)	1.24	0.29	0.01
Market to Book	Market to Book (w)	6.90	0.00	0.14
Stock Return		13.92	0.00	0.08
Stock Return	Brand Value (log)	12.86	0.00	0.08
Stock Return	Sales growth (2) Year	1.82	0.14	0.40

Note. (w) refers to winsorising. In the case of the Market to Book Ratio, this is done at the 2nd and 98th percentile. (2) refers to the variables being squared. Here, Sales Growth (2) was added in addition to Sales Growth as a control variable.

The Ramsey reset test checks the model's functional form, checking for linearity or missing interactions between some variables. I use this test to formally understand the most appropriate and valuable transformation based on the intuition in the previous paragraph. Here, it is important to have no multicollinearity issues (which was verified earlier). The test also requires the normality of errors, homoskedasticity, and no autocorrelation. Looking at Table 4, we cannot reject the null hypothesis of no omitted variables and no incorrect functional form when the p-value is bigger than 0.05. Therefore, no changes will be made to the market-to-book ratio and net sales. However, for stock returns, sales growth square, and the year control variable will be added for the regressions and the following tests. The log of brand value will also never be taken, as visual inspections (Appendix C), the Ramsey test, the persistence of heteroskedasticity after the log transformation and intuition all led me to this decision (Manning & Mullahy, 2001).

Table 5. Distribution of Residuals – Skewness and Kurtosis Test

	Skewness	Kurtosis	Joint test
Net Sales	0.00	0.00	0.00
Market to Book Ratio	0.00	0.00	0.00
Stock Return	0.00	0.00	0.00

Note. P-values are reported above.

As suspected from Appendix B, we see high skewness as we reject the null hypothesis of normal distribution in all three models; using clustered standard errors could be beneficial.

Table 6. Woolridge Test – Autocorrelation

	F-statistic	P-value
Net Sales	281.78	0.00
Market to Book Ratio	5.579	0.02
Stock Return	0.064	0.80

Note. Factor variables are not allowed; therefore, the year variable is not added to the Stock Return equation.

The p-value is smaller than 0.05 for the first two models, where the null hypothesis of no autocorrelation in the residuals is rejected. For the Stock Return model, the null hypothesis cannot be rejected. This can be explained intuitively by the erratic nature of stock returns, which are hard to predict and have large deviations. In contrast, market capitalization and book value accumulate year over year and, therefore, can have higher autocorrelation. This could lead to biased standard errors and inefficient estimators. Many options can be used to deal with autocorrelation here: cluster-robust standard error, generalised least square, dynamic panel data models, or lagged dependant variables. In addition to panel data regressions, robust standard errors will be used to mitigate the problems.

Table 7. Heteroskedasticity Tests

	Breusch Pagan/Cook-Weisberg	N*R2 version	F-statistic version
Net Sales	0.00	0.00	0.00
Market to Book Ratio	0.00	0.54	0.54
Stock Return	0.00	0.00	0.00

Note. Only p values are reported.

Table 7 shows that the null hypothesis of the Breusch Pagan test of homoskedasticity is rejected for all three models. However, for the Market to Book ratio, the null hypothesis cannot be rejected in the two tests that drop the assumption of a normal error distribution. Based on the previous test, autocorrelation is present in the sample, which is intuitive as we study firms over time. This means that the two tests that drop this assumption are more robust.

5.2. Regressions

Table 8. Intra-Class Correlation Test

	ICC
Net Sales	
Firm ID	0.92
SIC	0.00
Global	0.10
SIC | Firm ID	0.92

SIC | Global	0.92
Market To Book Ratio	
Firm ID	0.03
SIC	0.04
Global	0.00
SIC | Firm ID	0.05
SIC | Global	0.03
Stock Return	
Firm ID	0.00
SIC	0.00
Global	0.00
SIC | Firm ID	0.00
SIC | Global	0.00

Many earlier assumptions fail to hold. Despite this, one way to achieve more robust results is to use clustered standard errors. Based on Table 8, clustering by firm ID for Net Sales Models is very significant, as suspected earlier. Here, it signifies that 92% of the variance of Net Sales comes from the differences between the firms. Even though the test suggests that clustering might not be necessary for both Market-to-Book Ratio and Stock Return, out of precaution and economic intuitions, clustering by firm ID will still be used for all three regression equations; each firm has unique characteristics, leading to correlation in the error term.

Table 9. Fixed Effect Regression of Net Sales on Brand Value

	Model 1 Net Sales	Model 2 Net Sales	Model 3 Net Sales
Brand Value	1.26^{***}	0.99^{***}	0.91^{***}
	(0.12)	(0.06)	(0.07)
Employee		0.16^{***}	0.17^{***}
		(0.02)	(0.02)
Sales Growth		499.27^{***}	496.28^{***}
		(87.10)	(85.41)
Total Assets			0.02^{***}
			(0.00)

Constant	69787.55***	38957.76***	31082.64***
	(3369.53)	(4467.53)	(3991.22)
Observations	1520	1520	1520
R^2 Within	0.51	0.59	0.61
R^2 Between	0.12	0.33	0.34
R^2 Overall	0.17	0.39	0.39

Note. Fixed Effect Panel Regressions, using firm id as cluster variable. Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Finally, I can perform the main regressions of the paper. Table 9 shows the separate models of the Net Sales relationship. We see that Brand Value stays statistically significant at a 5% level. From the first model, an increase in Brand Value of 1 million is associated, on average, with an increase of 1.26 million dollars in Net Sales. When adding control variables, the brand value stays economically significant, associated with an average increase of 0.91 million dollars, keeping all other variables constant. All other control variables are highly statistically significant and economically significant. The base model shows that brand value is a great predictor for Net Sales, explaining 51% of its variations alone.

Table 10. Fixed Effect Regression of Market to Book Ratio on Brand Value

	Model 1	Model 2	Model 3
	Market to Book	Market to Book	Market to Book
Brand Value	0.00	0.00	0.00
	(0.00)	(0.00)	(0.00)
Employee		-0.00	-0.00
		(0.00)	(0.00)
Sales growth		0.07*	0.06
		(0.04)	(0.04)
Net Sales			0.00
			(0.00)
Total Assets			-0.00**

			(0.00)
Constant	3.39***	3.53**	3.36**
	(0.86)	(1.40)	(1.50)
Observations	1520	1520	1520
R^2 Within	0.00	0.00	0.00
R^2 Between	0.00	0.00	-0.00
R^2 Overall	0.00	0.00	0.00

Note. Fixed Effect Panel Regressions, using firm id as cluster variable. Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 10 shows that brand value and my controls have no statistical or economic significance. To understand these results further, additional regression on market capitalisation and book value will be performed, as shown below.

Table 11. Fixed Effect Regression of Market Value on Brand Value

	Model 1 Market Cap.	Model 2 Market Cap.	Model 3 Market Cap.
Brand Value	5.50***	5.88***	5.62***
	(0.80)	(0.99)	(0.97)
Employee		-0.17	-0.29*
		(0.15)	(0.15)
Sales Growth		862.60***	555.66**
		(231.86)	(232.58)
Net Sales			0.64***
			(0.21)
Total Assets			-0.08***
			(0.02)
Constant	-2919.93	16276.55	28018.58**
	(23002.58)	(11535.50)	(13945.94)
Observations	1520	1520	1520

R^2 Within	0.66	0.67	0.69
R^2 Between	0.37	0.38	0.38
R^2 Overall	0.59	0.59	0.54

Note. Fixed Effect Panel Regressions, using firm id as cluster variable. Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 11 shows that book value has statistical and economic significance in market value. Looking at the most comprehensive model (3), an increase of 1 million dollars in brand value is associated with an increase of 5.62 million in market capitalisation.

Table 12. Fixed Effect Regression of Book Value on Brand Value

	Model 1 Book Value	Model 2 Book Value	Model 3 Book Value
Brand Value	0.78***	0.78***	0.39*
	(0.21)	(0.28)	(0.22)
Employee		0.00	0.00
		(0.05)	(0.04)
Sales Growth		66.92	7.58
		(45.61)	(39.65)
Net Sales			0.10**
			(0.04)
Total Assets			0.07***
			(0.01)
Constant	46573.54***	45918.77***	12656.87**
	(6084.08)	(7051.94)	(5200.62)
Observations	1520	1520	1520
R^2 Within	0.30	0.30	0.66
R^2 Between	0.13	0.13	0.57
R^2 Overall	0.13	0.13	0.64

Note. Fixed Effect Panel Regressions, using firm id as cluster variable. Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 12 shows that book value has no statistical or economic significance on Stock Returns once all my control variables are added. This result helps us better understand Table 10. My main hypothesis for those results is that the ratio dilutes the effects.

Table 13. Fixed Effect Regression of Stock Return on Brand Value

	Model 1 Stock Return	Model 2 Stock Return	Model 3 Stock Return
Brand Value	-0.00***	0.00	-0.00
	(0.00)	(0.53)	(0.00)
Employee		-0.00**	-0.00***
		(0.00)	(0.00)
Net Sales		-0.00	0.00
		(0.00)	(0.00)
Total Assets		-0.00***	-0.00***
		(0.00)	(0.00)
Sales Growth		0.87***	0.50***
		(0.09)	(0.09)
Sales Growth (2)		-0.00***	-0.00***
		(0.00)	(0.00)
Year Fixed Effects	No	No	Yes
Constant	10.21***	12.39***	25.05***
	(0.70)	(2.67)	(3.78)
Observations	1516	1516	1516
R^2 Within	0.00	0.09	0.42
R^2 Between	0.05	0.05	0.27
R^2 Overall	0.00	0.07	0.35

Note. Fixed Effect Panel Regressions with clustered standard errors by the firm. Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 13 shows that brand value alone has no predictive power of stock return, with an R-square of 0 and no economic significance. After adding my control variables (except year), we see that brand value becomes statistically insignificant at a 5% level. This suggests that the omitted variable bias is

reduced, and the effect of brand value is better isolated. However, this second model still has no predictability of stock return. Once adjusting for years, we see how years have become a significant predictor of stock return, with the third model explaining 0.41 of the stock return variances.

5.3. Robustness

Table 14. Breusch Pagan and Hausman Test

	Breusch Pagan LM test	Hausman Test
Net Sales	0.00	0.44
Market to Book Ratio	1.00	0.53
Stock Return	0.00	0.45

In this robustness section, I want to test alternative models and techniques to better understand the three relationships being studied. From the Breusch Pagan test, we cannot reject the null hypothesis for the market-to-book ratio, meaning a pooled OLS is preferred. We can reject the hypothesis for the others, meaning a panel regression with a random effect would be preferred. Looking at the Hausman test, we cannot reject the null hypothesis for the Net Sales and Stock Return, meaning a random effect model is preferred. Even though economic theory suggests using fixed-effect models when studying firms over time, statistical tests suggest the possible use of alternative methods. This can be beneficial to understanding how robust the results can be to different assumptions. These tests are also beneficial because they incorporate time-invariant variables, so their effects can be studied (Appendix E). All the tests show similar results previously found, making the results more robust.

Appendix F, which examines the results from the dynamic panel regression with fixed effects using maximum likelihood, provides some new insights. In Table 20, we see the high amount of previously suspected autocorrelation. Indeed, given these results, Net Sales have a high level of persistence. We also noticed that brand value remains statistically significant. Table 21 shows that past market-to-book ratios are not statistically significant. The same conclusions have been reached about the effect of brand value on the market-to-book ratio. However, we see that brand value has no statistically significant effect on Market Capitalization (in contrast to our previous tables), although it is still economically significant. Here, the high effect of the past value of the market capitalisation made brand value insignificant. Finally, Table 23 shows a negative coefficient of the lagged stock return. This could possibly be explained through the mean reversion of many market variables. Indeed, if stock return is abnormally high one year, it will likely return to its more usual state the following year. Finally, we see that brand value is statistically and economically insignificant, as shown in my previous results.

Table 15. Levin Lin Chu Unit Root Test

	p-value
Net Sales	0.10
Net Sales (differenced)	0.00
Market to Book Ratio	0.00
Stock Return	0.00
Brand Value	0.10
Brand Value (differenced)	0.00

Note. Thirty-four observations are lost when taking the difference.

To end the robustness verification, I perform a Granger causality test. Table 13 shows that Net Sales and Brand Value suffer from unit roots at a 5% significance level. This makes sense as brand value can accumulate over the years, while net sales can show a trend based on firms' yearly growth and inflation.

Table 16. Granger Causality Test

	Z-bar p-value	Z-bar tilde p-value
Net Sales (differenced)	0.00	0.03
Market to Book Ratio	0.00	0.08
Stock Return	0.18	0.12

Note. Only the difference of Net Sales and Brand Value to take care of the unit root.

The Granger causality test shows that Net Sales are granger caused by brand value. However, as discussed previously, the sample can have reverse causality, which this test strongly assumes is not present. Therefore, results can be biased, but these results do seem to correspond to the findings from previous regressions and do not contradict each other.

CHAPTER 6 Discussion

6.1. Assumptions

Concerning the implicit assumptions of OLS regressions, my sample of firms shows no multicollinearity issues. No changes or transformations were made to the functional form of our regressions when investigating them. Appendix B shows that some variables are very skewed and do not follow a normal distribution, which could signal some issues; however, from Appendix C, all relationships seem linear.

We see that many of the main OLS assumptions fail, from the heteroskedasticity to the normal distribution of the residuals. For the first model, with the Net Sales as our dependent variable, we have the test for heteroskedasticity, which is rejected, autocorrelation is present, and the error terms are skewed. For the second model, with the Market to Book value ratio, we see that the null hypothesis for heteroskedasticity cannot be rejected. Finally, for my third model, with Stock Return as the dependent variable, we see that heteroskedasticity is present and the distribution of residuals is not normally distributed. However, we cannot reject the null hypothesis of autocorrelation. This makes sense, as stock returns are known to be very hard to predict and, therefore, have very little in common with past values. To address these issues, clustered robust standards at the firm level are implemented using panel data information. Fixed-effect regression and the additional test in the robustness section can also help alleviate many issues.

6.2. Regressions

Starting with Table 9 of the regression results, we see that Brand Value stays statistically significant at a 5% level in all three model variations. In addition to this relationship, we must remember that Net Sales are a yearly accounting term. As brand value accumulates, its economic impact becomes even more significant. The firm's size was also statistically significant, with both variables Employee and Total Asset. This finding is similar to the previous papers that examined this relationship. One such paper being Kim et al. (2003).

Shifting to the results from Table 10, we see that Brand Value is not statistically significant at a 5% level on all the models and has no economic significance. When examining the control variables, the same issue arises. These findings are quite different from the ones from Kerin & Sethuraman (1998), where they find a high correlation between the two variables and a strong effect of Brand Value on the Market to Book ratio. Our market-to-book mean are similar in both our papers. However, mine has

vastly higher deviations and extremes. The differences seen could stem from the vastly different samples and the changes in the type of companies over time (rise of technology). To understand the relationship further, Tables 11 and 12 are made. Once control variables are introduced, Brand Value substantially impacts the Market Capitalization, not book value. Therefore, the Market to Book might be less sensitive than my market capitalisation variable.

Finally, Table 11 shows that Brand Value has no statistically significant impact on Stock Return. The time perspective is the most essential variable in determining Stock Return. This shows how stock returns are sensitive to economic conditions rather than the firm's characteristics and the hard predictability of them.

6.3. Robustness

To check the robustness of my previous results, I investigated different models with changing assumptions. Additional regressions help us understand the relationship further. These tests are placed in Appendix E. Here, we see that the outcome for our variable of interest remains unchanged. With these tests, we can finally notice the important role geographic locations play in my market-based performance measures. Intuitively, we know that financial markets in America act quite differently and are of different sizes from those abroad. However, for Net Sales, the geographical location is not statistically significant; instead, the industry in which the company operate has a more significant impact. As my sample comprises multinationals, these results are intuitive.

I then performed dynamic panel regressions that used the generalised structural equation modelling in Appendix F. This method should prove to be more robust against endogeneity (reverse causality issue) and autocorrelation (addition of lagged dependant variable) issues. Once again, we have a statistical effect of brand value on Net Sales. However, Brand Value is statistically insignificant for Market to Book and Market Capitalization, which can cast doubt on my previous result. However, they are still economically significant for Market Capitalization. All the tests for stock return show no statistical or economic significance, proving that stock return is a complex variable that is hard to determine from firm characteristics and assets.

The final test, the Granger Causality test, shows that net sales are grangers caused by brand value at a 5% significance level. This does not provide us with true causality, but it does mean that brand value has some predictive power over net sales, as the previous tests also hinted at.

CHAPTER 7 Limitations

A primary limitation of my study would be the sample of firms. Indeed, this research could have been much more thorough and shown a much broader picture if I could get brand value approximations for a random sample of firms. However, the top 100 firms in terms of brand value were chosen due to data availability (the top 500 list requires payment). This means the sample presented is relatively small and not randomly selected; therefore, it only studies the effect of brand value on multinational firms, which are very large and influential. The results and conclusion of this research cannot be applied to small businesses or even medium-sized companies.

The kind of firm studied was also limited. Firms not publicly traded on stock markets were excluded from my research as finding their accounting information would have taken considerably more time and effort, and the market measurements do not exist. Another limitation of the sample was apparent when performing the Granger causality test. As we can see, the sample could be more balanced, as the firms in the top 100 ranking in terms of brand value vary year over year.

Another limitation of my study would be the control variables chosen or the absent ones. Of course, including all suitable control variables is almost impossible, but one variable I imagine future researchers would use is research and development expenditure. This variable correlates with brand value and influences net sales and other performance metrics. This variable does not appear here, as the DataStream R&D variable had too many missing values. As the dataset of my study is already limited, I preferred to keep the size of my dataset rather than adding more controls.

Research on intangibles relies on either proxies or estimations. In this study, I chose a dataset that relied on estimations made by a single company. Both methods are subject to estimation errors or do not accurately reflect firms' brand value. However, this issue is not easily solvable. Understanding these limitations will help guide future research investigating similar relationships.

CHAPTER 8 Conclusion

Firms increasingly rely on their intangible assets as the primary source of their value offering. Therefore, understanding how these intangible assets might affect the primary purpose of public companies, benefiting the shareholders (Friedman, 1970), would be crucial for business decisions. This led me to investigate the following research question: "**How does brand equity impact a firm's performance and market value?"**

To answer this question, I examined the relationship between brand value and a firm's performance. This was done using estimations of the top 100 firms regarding brand value and their sales and market information from 2007 to 2023. I used fixed effect panel regressions and a handful of other tests to understand this relationship clearly. The result shows a strong positive effect on net sales, including some great predictive power, supporting my first hypothesis; however, the effect was less present in the market measures, my second hypothesis. Stock Return was not statistically affected by brand value, and its most substantial effect in terms of magnitude came from the individual years. This shows the complex nature of stock returns and their dependency on the macroeconomic environment. Finally, the effect on Market to Book was not able to be perceived from these tests; however, the effect on Market Capitalization in all tests was economically significant and statistically significant in many.

This study's results can help further understand intangibles' effect on a firm's performance. Increasing brand value and perception efforts can significantly benefit the firm's revenue and growth. For the results on the market, more research and samples will have to be studied, as my paper cannot find a strong relationship with the Market to Book value. However, Brand Value strongly impacts market capitalisation, meaning investors consider it when investing and performing valuations. The market value of firms is theorised to reflect the firm as a whole, and these findings help support that theory. The stock returns have been known to be extremely hard to predict, being a zero-sum game for investors, and this paper's findings agree with that idea.

The study of intangibles in the scientific field is extensive. However, due to their complicated nature, finding an apparent effect is a challenge. These results can help guide future research and provide more evidence and results in this field. Regarding the implications for the non-scientific community, these findings can guide firms in determining what strategy will be best for their shareholders and be useful for analysts to understand how to price and predict market value.

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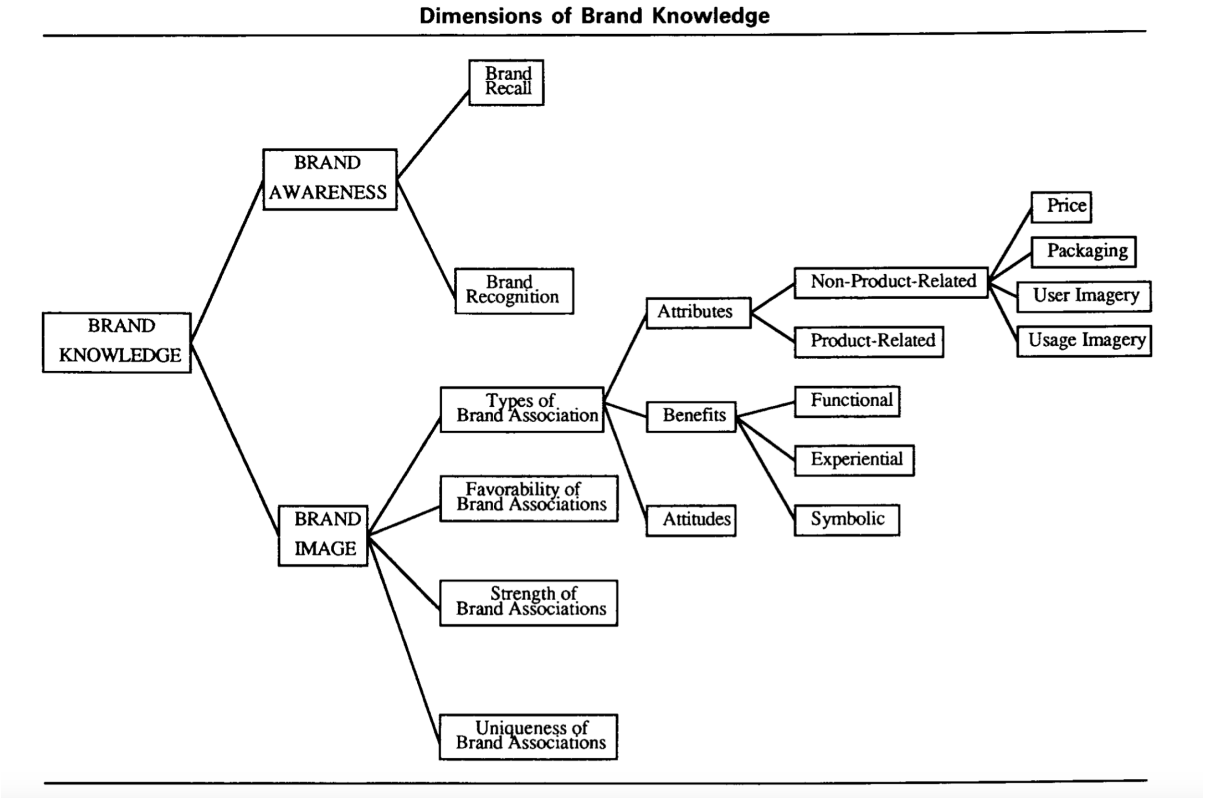
APPENDIX A Brand Definitions

Figure 1. Brand Value Calculation from Brand Finance

Note. Taken from Brand Finance 2024 Report.

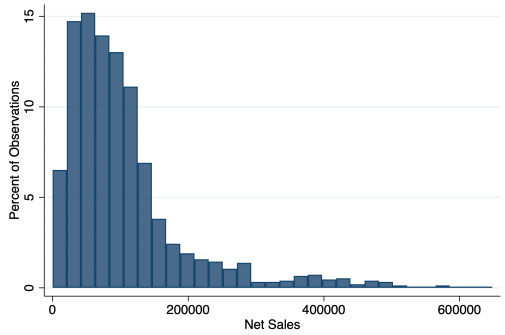
Figure 2. Brand Equity Dimensions



Note. From Keller (1993).

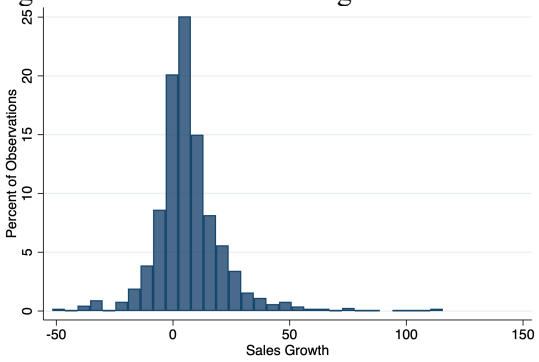
APPENDIX B Main Variables Histograms

Figure 3. Net Sales Histogram



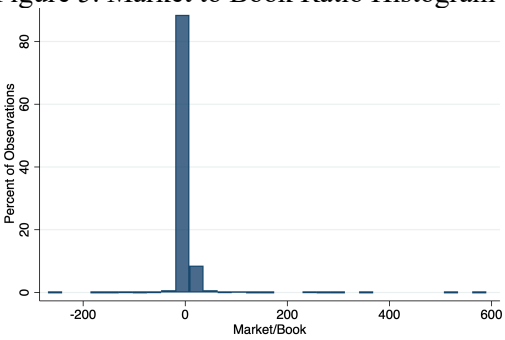
Note. Skewed data of Net Sales

Figure 4. Sales Growth Histogram



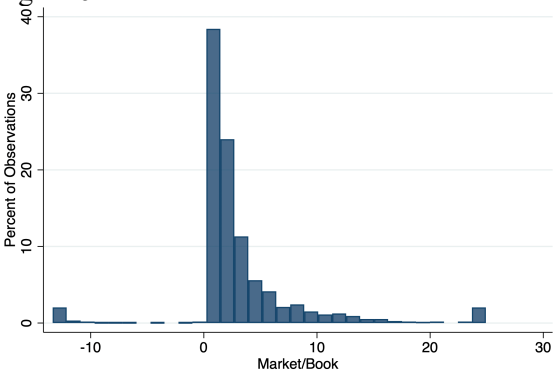
Note. Concentration of observations

Figure 5. Market to Book Ratio Histogram



Note. Large outliers. Such companies include Oracle, which changed its business to cloud computing; Home Depot, which has a slightly negative book value; Boeing, Marlboro, and UPS.

Figure 6. Market to Book Ratio Winsorised Histogram



Note. The market-to-book ratio is winsorised to the 2nd and 98th percentile.

Figure 7. Stock Return Histogram

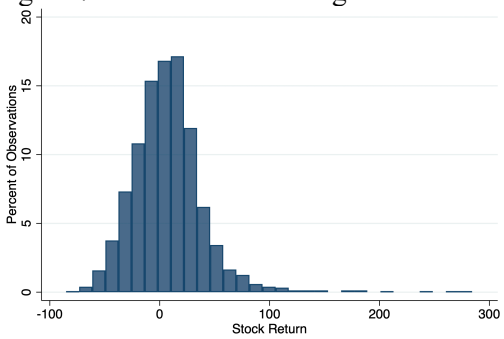
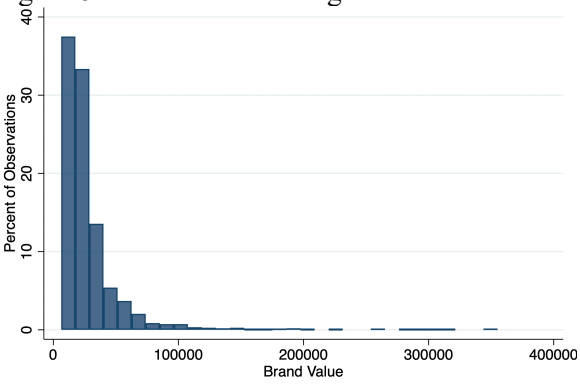
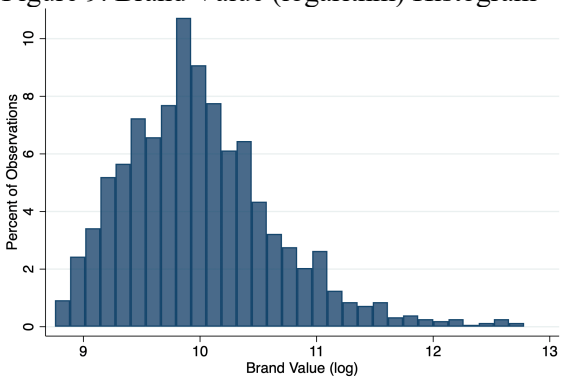


Figure 8. Brand Value Histogram



Note. Skewed data

Figure 9. Brand Value (logarithm) Histogram



APPENDIX C Relationship Visualization

Figure 10. Net Sales and Brand Value Scatterplot

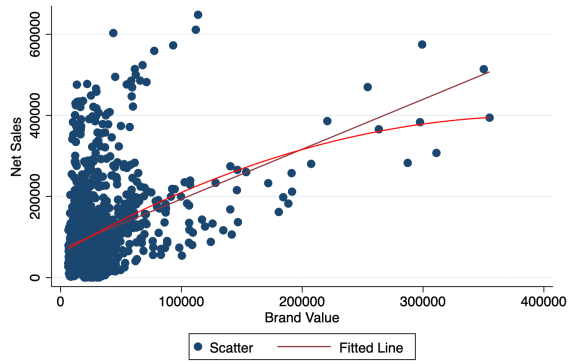


Figure 11. Market to Book Ratio and Brand Value Scatterplot

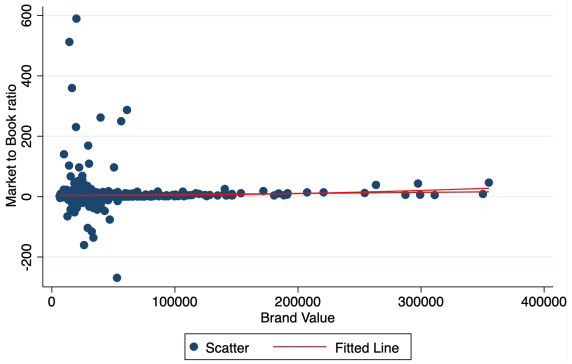


Figure 12. Stock Return and Brand Value Scatterplot

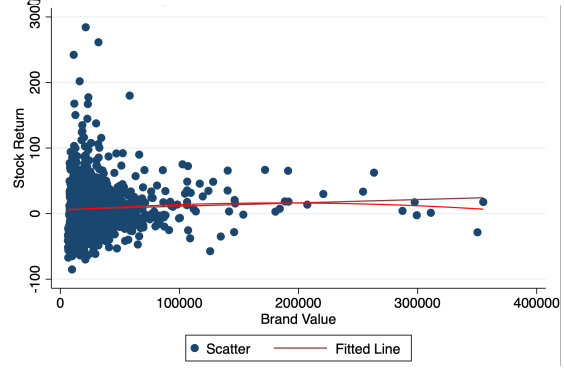
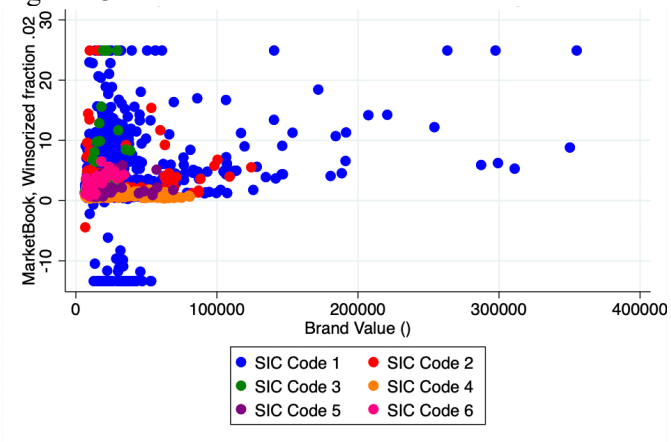


Figure 13. Market to Book Ratio and Brand Value Scatterplot by SIC



Note. Brand Value might affect Market-to-Book Ratios differently depending on the industry in which they operate. However, this paper will not explore the interaction effect due to the small sample size.

APPENDIX D Diagnostic Testing

Figure 14. Residuals histogram Net Sales Equation (1)

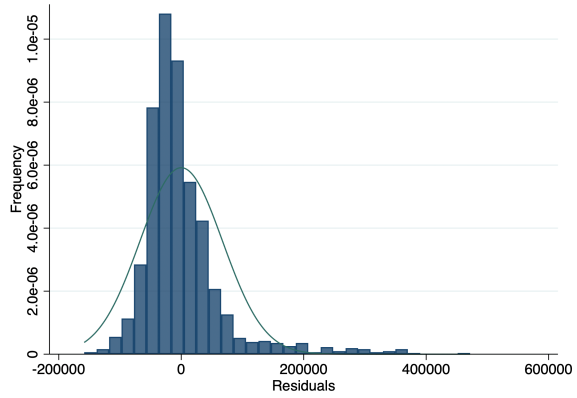


Figure 17. Residuals histogram Market to Book Ratio Equation (2)

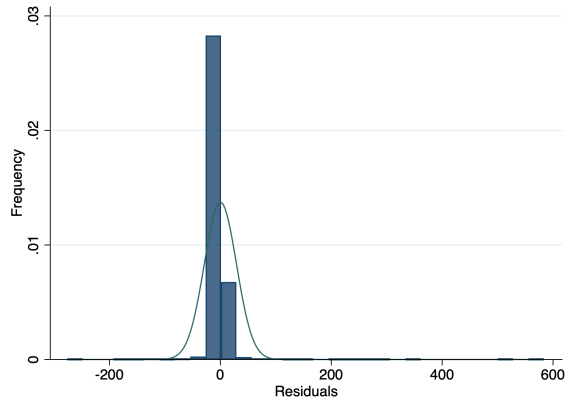
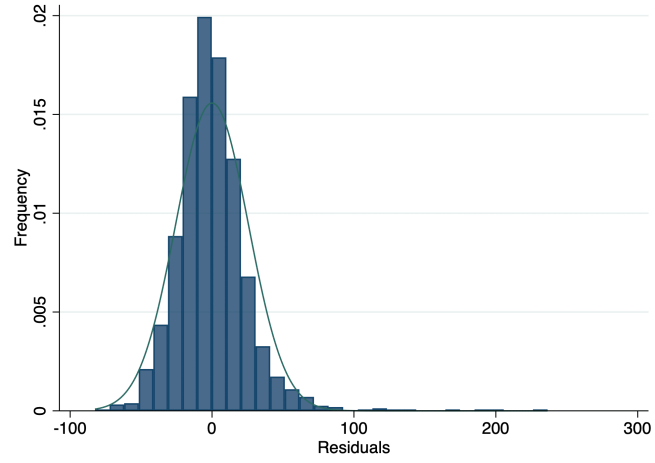


Figure 18. Residuals histogram Stock Return Equation (3)



APPENDIX E Regression Variations

Table 17. Random Effect Regression of Net Sales on Brand Value

	Model 1 Net Sales	Model 2 Net Sales	Model 3 Net Sales
Brand Value	1.26***	0.98***	0.89***
	(0.12)	(0.06)	(0.07)
Employee		0.17***	0.17***
		(0.02)	(0.02)
Global		16639.54*	15519.19
		(9466.14)	(9938.28)
Sales Growth		490.71***	490.02***
		(88.10)	(86.06)
SIC – 2			-19915.39*
			(10758.24)
SIC – 3			-52567.19***
			(12079.70)
SIC – 4			-39564.47***
			(10074.37)
SIC – 5			31206.83**
			(15552.66)
SIC – 6			-12950.93
			(8849.51)
Total Asset			0.02***
			(0.00)
Constant	58519.79***	22557.16***	24250.63***
	(5936.12)	(6708.86)	(7139.14)
Observations	1520	1520	1520
R^2 *within*	0.51	0.59	0.61
R^2 *between*	0.12	0.34	0.40
R^2 *overall*	0.17	0.42	0.46

Note. We can also see how the SIC has a statistical significance. SIC 1 taken as reference category. Standard errors in parentheses* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 18. Pooled OLS Regression of Market to Book ratio on Brand Value

	Model 1	Model 2	Model 3
	Market to Book	Market to Book	Market to Book
Brand Value	0.00**	0.00	0.00*
	(0.00)	(0.00)	(0.00)
Employee		-0.00	-0.00
		(0.00)	(0.00)
Global		-4.79***	-3.50**
		(1.63)	(1.52)
Sales Growth		0.03	0.03
		(0.02)	(0.02)
SIC – 2			-0.87
			(1.15)
SIC – 3			15.20*
			(7.85)
SIC – 4			-1.79
			(1.35)
SIC – 5			-1.16
			(0.85)
SIC – 6			-2.25
			(1.72)
Net Sales			-0.00
			(0.00)
Total Assets			-0.00
			(0.00)
Constant	2.15***	6.37***	6.25***
	(0.19)	(1.86)	(2.21)
Observations	1520	1520	1520
R^2	0.04	0.01	0.02
Adjusted R^2	0.04	0.01	0.01

Note. Here, we can see how the SIC has no statistical significance. SIC 1 taken as reference category. Standard errors in parentheses* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 19. Random Effect Regression of Stock Return on Brand Value

	Model 1	Model 2	Model 3
	Stock Return	Stock Return	Stock Return
Brand Value	0.00**	0.00	0.00
	(0.00)	(0.00)	(0.00)
Employee		-0.00	-0.00
		(0.00)	(0.00)
SIC – 2		-5.95***	-6.17***
		(1.75)	(1.62)
SIC – 3		2.06	1.43
		(2.70)	(2.65)
SIC – 4		-0.61	-0.64
		(3.71)	(3.51)
SIC – 5		0.77	0.79
		(2.73)	(2.97)
SIC – 6		1.91	-0.90
		(2.50)	(2.29)
Gloabal		-2.48*	-3.26**
		(1.40)	(1.37)
Net Sales		-0.00	-0.00
		(0.00)	(0.00)
Total Assest		-0.00	-0.00*
		(0.00)	(0.00)
Sales Growth		0.85***	0.57***
		(0.07)	(0.07)
Sales Growth (2)		-0.01***	-0.00***
		(0.00)	(0.00)
Year Effect	No	No	Yes
Constant	6.55***	7.69***	20.49***
	(11.42)	(1.16)	(2.46)

Observations	1516	1516	1516
R^2 *within*	0.00	0.08	0.41
R^2 *between*	0.05	0.12	0.43
R^2 *overall*	0.00	0.11	0.41

Note. Here, we can see how the SIC has no statistical significance. SIC 1 taken as reference category. Standard errors in parentheses* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

APPENDIX F Dynamic Panel Regression (Maximum Likelihood)

Table 20. Dynamic panel model with fixed effects of Brand Value on Net Sales

	Model 1 Net Sales	Model 2 Net Sales	Model 3 Net Sales
Lag Net Sales	0.67***	0.79***	0.78***
	(0.06)	(0.05)	(0.05)
Brand Value	0.47***	0.29***	0.29***
	(0.08)	(0.05)	(0.04)
Employee		0.05***	0.05***
		(0.01)	(0.01)
Global		-182.10	-9932.30***
		(896.70)	(1431.94)
Sales Growth		1002.76***	998.72***
		(162.54)	(162.73)
SIC – 2			9804.00***
			(1742.49)
SIC – 3			-16224.06***
			(2850.61)
SIC – 4			-8479.33***
			(2255.73)
SIC – 5			40868.96***
			(8905.72)
SIC – 6			-2757.17***
			(639.79)

Total Assets			0.00
			(0.00)
Constant	-4634.83	-2095.48***	-2073.50***
	(1443.76)	(663.80)	(670.57)
Observations	1273	1273	1273
Log Likelihood	-14385.90	-14059.59	-14058.94

Note. Standard errors in parentheses* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Clustered standard errors by the firm, with firm-fixed effects. Using Generalized Structural Equation Modelling.

Table 21. Dynamic panel model with fixed effects of Brand Value on Market to Book

	Model 1	Model 2	Model 3
	Market to Book	Market to Book	Market to Book
Lag Market to Book	-0.02	-0.02	-0.02
	(0.05)	(0.05)	(0.05)
Brand Value	0.00	0.00*	0.00
	(0.00)	(0.00)	(0.00)
Employee		-0.00	-0.00
		(0.00)	(0.00)
Global		-4.63***	-0.17
		(0.37)	(0.87)
Sales Growth		0.08	0.08
		(0.07)	(0.07)
Net Sales			0.00
			(0.00)
Total Assets			-0.00**
			(0.00)
SIC – 2			-4.66***
			(1.20)
SIC – 3			42.26***
			(4.18)
SIC – 4			-2.69
			(1.83)
SIC – 5			-5.37
			(3.88)

SIC – 6			-3.48***
			(0.64)
Constant	5.35***	5.59***	5.50***
	(0.35)	(0.69)	(0.71)
Observations	1273	1273	1273
Log Likelihood	-5861.92	-5860.57	-5860.15

Note. Standard errors in parentheses* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Clustered standard errors by the firm, with firm fixed effects. Using Generalized Structural Equation Modelling.

Once again, I ran into the same issue as with the earlier regression; therefore, I added below a regression that only looks at the effect on market capitalization.

Table 22. Dynamic panel model with fixed effects of Brand Value on Market Capitalization

	Model 1 Market Cap.	Model 2 Market Cap.	Model 3 Market Cap.
Lag Market Cap.	0.98***	0.97***	0.95***
	(0.09)	(0.08)	(0.09)
Brand Value	0.37	0.62*	0.52
	(0.36)	(0.35)	(0.38)
Employee		-0.10**	-0.15***
		(0.04)	(0.05)
Global		-17014.18***	-12656.63***
		(2367.24)	(3917.15)
Sales Growth		826.87***	677.48***
		(191.04)	(163.76)
Net Sales			0.31**
			(0.12)
Total Assets			-0.02***
			(0.01)
SIC – 2			-7976.33
			(6945.24)
SIC – 3			32839.29**
			(14858.19)
SIC – 4			22989.07*
			(13235.92)

SIC – 5			-8125.87
			(19566.55)
SIC – 6			-20979.04***
			(2600.14)
Constant	6270.00*	11549.07***	10506.37***
	(3346.38)	(2683.37)	(2672.35)
Observations	1273	1273	1273
Log Likelihood	-15731.32	-15702.16	-15688.58

Note. Standard errors in parentheses* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Clustered standard errors by the firm, with firm fixed effects. Using Generalized Structural Equation Modelling.

Table 23. Dynamic panel model with fixed effects of Brand Value on Stock Returns

	Model 1 Stock Return	Model 2 Stock Return	Model 3 Stock Return
Lag Stock Return	-0.22***	-0.26***	-0.15***
	(0.02)	(0.02)	(0.03)
Brand Value	-0.00**	0.00	-0.00
	(0.00)	(0.00)	(0.00)
Employee		-0.00***	-0.00***
		(0.00)	(0.00)
Global		-35.51***	-28.25***
		(1.47)	(2.56)
Sales Growth		0.93***	0.52***
		(0.11)	(0.08)
Sales Growth (2)		-0.01***	-0.01***
		(0.00)	(0.00)
SIC – 2		17.18***	16.84***
		(1.52)	(1.77)
SIC – 3		4.53	9.28**
		(4.17)	(4.36)
SIC – 4		-1.50	4.68
		(3.13)	(3.15)
SIC – 5		9.65*	11.17*
		(5.67)	(6.08)

SIC – 6		-36.45***	-25.49***
		(1.08)	(3.27)
Net Sales		-0.00	0.00
		(0.00)	(0.00)
Total Assets		-0.00*	-0.00***
		(0.00)	(0.00)
Year Dummy	No	No	Yes
Constant	19.01***	21.39***	10.83***
	(0.41)	(0.96)	(3.58)
Observations	1271	1271	1271
Log Likelihood	-6130.65	-6060.74	-5795.13

Note. Standard errors in parentheses* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Clustered standard errors by the firm, with firm fixed effects. Using Generalized Structural Equation Modelling.