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# The effect of brand assets on firm value and credit ratings – Evidence from Korea

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**ABSTRACT**

This study aims to empirically analyze the impact of brand assets, a company's core competency, on firm value and credit ratings using companies listed on the KOSPI and KOSDAQ from 2011 to 2019. We also investigate the moderating effect of a firm's life cycle on the impact of brand assets on firm value and credit ratings by dividing the life cycle into growth, maturity, and decline stages, according to the economic characteristics and development process of the company. The results show that brand assets have a positive impact on firm value and credit ratings and that the impact of brand assets on firm value and credit ratings is greater for firms in the growth stage than for firms in other stages. Our findings on the effects of brand assets on firm value in the capital market and credit ratings in the bond market suggest that there is a need for broader recognition of brand assets as a source of future earnings and value creation, and a redefinition of financial reporting standards.

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## 1. Introduction

Brand assets are recognized as core competencies for the sustainable management of companies and intangible assets that create value as an important component of a company.

Interbrand, a global brand consulting group, selects the top 100 best global brands annually and announces brand valuation and ranking. The 2020 Best Global 100 Brands included Apple ($322,999 million), Amazon ($200,667 million), Microsoft ($166,001 million), Google ($165,444 million), and Samsung Electronics ($62,289 million). Other Korean companies included Hyundai Motor ($14,295 million) and Kia Motors ($5,830 million).

Comparing the book value of intangible assets with the brand valuation provided by Interbrand Korea, the ratio of book value to brand value for Korean companies ranked among the top 100 global brands was 10.3% for Samsung Electronics, 28.6% for Hyundai Motors, and 35.5% for Kia Motors. This means that book value is significantly lower than brand value, which is contrary to the original purpose of financial statements to provide external information users with useful information for investment decision-making. This is due to the fact that brand assets are built through advertising and R&D expenses, which under current accounting standards tend to underestimate the value of intangible assets because they are not properly recognized in financial statements. Lee (2001) argued that the book value of intangible assets recorded in the balance sheet has less explanatory power for firm value than the book value of other assets and liabilities, such as tangible assets. Among the expense items shown in the income statement, R&D and advertising expenses have been analyzed for their relevance to firm value in many studies as intangible expenditures.

Other studies also find that brand assets are significantly and positively related to the capital market and positively related to advertising expenditures (Barth et al., 1998). On the other hand, Anderson and

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Mansi (2009) use bond market ratings as a proxy for firm value performance and find a significant positive relationship between ACSI, a U.S. customer satisfaction index, credit ratings, and bond spreads. Jeon et al. (2012) also found that the Korean Customer Satisfaction Index (KCSI) has a significant positive effect on credit ratings.

Therefore, this study investigates whether brand assets, which are a company's core competencies, have a positive impact on firm value and credit rating. Additionally, by categorizing the firm life cycle into growth, maturity, and decline stages according to the economic characteristics of the company, this study confirms that the impact of brand assets on firm value and credit rating differs depending on the firm's life cycle by establishing appropriate management strategies.

The contributions of this study are as follows. First, it is the first empirical analysis of the impact of brand assets on credit ratings in the bond market. It is expected that there will be much research on the relevance of credit ratings, which are used as important indicators in the bond market, using various measures of brand assets. Second, this study analyzes, for the first time, the impact of brand assets on firm value and creditworthiness by dividing the life cycle into growth, maturity, and decline stages according to the development process of a company. This could stimulate further research on the impact of brand assets on the value and credit ratings of firms in different contexts. On the other hand, previous studies on the impact of brand assets on financial performance and firm value have used the Korea Brand Power Index (K-BPI) announced by the Korea Performance Association Consulting as a measure of brand assets. These K-BPIs were based on the top three brands in each industry; therefore, the sample size was limited, limiting their generalizability. Therefore, this study uses the Brand Stock Top Index (BSTI), a brand valuation index that combines the Brand Stock Index generated by the Brand Stock Exchange and the Consumer Survey Index calculated by surveying consumers nationwide, as a measure of brand assets for several brands distributed in Korea. The inclusion of non-branded companies in the study complements the limited representativeness of previous studies and increases the validity of the findings through generalized validation. This is one of the contributions of this study.

The remainder of this paper is organized as follows. The research background and prior studies were reviewed, and research hypotheses were established in Section 2. Section 3 explains the research model used to investigate the research hypotheses, and describes the sample selection for empirical analysis. Section 4 presents the results of the empirical analysis of the hypotheses. Section 5 summarizes the research results and presents the implications and limitations of the study.

## 2. Research background and hypothesis

***2.1. The relationship between brand assets and firm value.*** Research has been conducted on the impact of brand assets, including stock prices and stock returns, on firm value. In a study on the relationship between brand assets and firm value, Simon and Sullivan (1993) considered brand assets as an increase in cash inflows due to the ownership of a product's brand and analyzed the relationship between intangible assets and brand value for US-listed firms using brand valuations published by Interbrand from 1984 to 1986. The analysis shows that the positive value relevance between brand assets and intangible assets is higher for consumer products such as food, beverages, tobacco, and clothing, whereas the value relevance is lower for intermediate products such as paper, petroleum refining, steel, primary metals, and base metals. Barth et al. (1998) found a significant positive relationship between brand assets, stock prices, and excess returns using 1,204 brand valuations published by Interbrand for 595 US-listed companies from 1991 to 1996. They also find that brand assets explain more variation in stock returns, which represents the market value of capital increase, than operating income. In a previous study on brand assets using Korean data, Park (2002) analyzed the relationship between brand assets and firm value using the model of Simon and Sullivan (1993). The empirical results suggest that brand assets are positively related to excess return and market value. Using the K-BPI as a measure of brand asset, Kim et al. (2019) found that brand assets were positively related to firms' earnings and firm value in a study of Korean listed firms from 2010 to 2016. This brand asset is the profit of a good brand name that adds value to the product (Wells et al., 1992), which is the incremental profit accrued in the future owing to the presence of the brand (Simon & Sullivan, 1993). It has also been suggested that branded products have the potential to provide firms with higher operating profits than unbranded products (Keller, 1993).

Brand assets are expected to have a positive impact on firm value, as they continue to demonstrate the value of differentiation as an important asset of a firm and bring greater benefits to shareholders and investors in terms of market efficiency. Previous studies have basically examined the impact of brand assets on firm value. However, studies on Korean firms have used the Korea Brand Power Index (K-BPI), which only includes the top three branded firms in each industry, so the sample is limited. Therefore, this study aims to increase the validity of the research results by using the Brand Stock Top Index (BSTI), a brand valuation index that combines the brand stock index generated by the brand stock exchange of Brand Stock and the consumer survey index calculated by surveying consumers nationwide, as a measure of brand assets. Accordingly, we establish Hypotheses 1, 1-1, and 1-2 as follows.

Hypothesis 1: Brand assets have a positive effect on firm value.

Hypothesis 1 -1: Firms included in the BSTI (Brand Stock Top Index) have a higher firm value than firms not included in the BSTI.

Hypothesis 1 -2: Among the firms included in the BSTI, firms with a higher level of brand assets have a higher firm value.

***2.2. The relationship between brand assets and credit ratings.*** Anderson and Mansi (2009) use a sample of 2,574 firms from 1994 to 2004 to test for a significant positive relationship between ACSI, a US index of customer satisfaction, and key bond market indicators such as credit ratings and bond spreads. This confirms that the more satisfied customers are with a brand, the higher the company's credit rating and, therefore, the lower the cost of financing. In other words, customer satisfaction is an important driver of firm value, and higher customer satisfaction with a brand leads to higher expectations of future cash flows owing to increased profitability, which in turn leads creditors to assess the recoverability of the debt they hold as higher.

Using the Korea Customer Satisfaction Index (KCSI) provided by the Korea Competence Association Consulting as a measure of customer satisfaction, Jeon et al. (2012) collected the KCSI results for 3,058 individual brands from 2000 to 2010 and then averaged the KCSI for multiple individual brands owned by the same company. Based on this data, an empirical analysis was conducted using 688 samples in the credit rating year. The results confirm that the KSCI has a positive impact on credit ratings and that customer satisfaction has a more significant positive impact on credit ratings for service companies than for manufacturing companies and for smaller companies than for larger companies. Kim and Lee (2015) studied the impact of sustainable management activities on firm value and corporate bond credit ratings in the capital market using ESG ratings published by the Korea Corporate Governance Council from 2011 to 2014 as a measure of sustainable management activities. The empirical analysis confirms that ESG ratings have an information disclosure effect, that companies with higher ESG ratings have higher firm value, and that ESG ratings and corporate bond credit ratings are significantly correlated.

In line with the above, it was confirmed that customer satisfaction and ESG activities have an impact on credit ratings. Although this provides an indirect indication, there is no direct research on how the value of brand assets affects credit ratings. Since brand assets are expected to have a positive impact on credit ratings by increasing the inflow of cash flows from sustained increases in profitability, we propose Hypothesis 2 as follows:

Hypothesis 2: Brand assets have a positive effect on the credit ratings.

Hypothesis 2 -1: Firms that are included in the BSTI (Brand Stock Top Index) have a higher credit rating than firms that are not included in the BSTI.

Hypothesis 2 -2: Among the firms included in the BSTI, those with a higher level of brand assets have higher credit ratings.

***2.3. Moderating effect of the business life cycle.*** Previous studies on the firm life cycle include Anthony and Ramesh (1992), who analyze the differentiation of financial information in accounting over the life cycle; Black (1998), who examines the value relevance of cash flows and accounting earnings over the life cycle; and Dickinson (2011), who identifies the firm life cycle using cash flows.

Anthony and Ramesh (1992) distinguish between the economic and financial characteristics of a firm and relate them to its life cycle using variables such as sales growth rate, dividend payout ratio, capital expenditure ratio, and firm age. This shows that sales growth and the capital expenditure ratio are important variables in the growth stage of a firm; thus, unexpected sales growth and the capital expenditure ratio are positively related to abnormal stock returns in the growth stage, while the relationship is different in the decline stage. Black (1998) examined the relative value relevance of cash flows from operating, financing, and investing activities to accounting earnings at different stages of a firm's life cycle. The empirical results show that the book value of equity and cash flows has high value relevance during the growth stages. Hribar and Yehuda (2007) found that firms' accruals in the growth stage are more value-relevant than those in the maturity or decline stages. This is evidence that the market's perception of accruals in growth companies is not a risk phenomenon but an indicator of growth. Dickinson (2011) measured a firm's life cycle based on cash flows from operating, financing, and investment activities. Each activity provides clear predictive information on future profitability. Won and Ryu (2016) divided the firm life cycle into growth, maturity, and decline phases and empirically analyzed the impact of competitive strategies on performance persistence in each phase. They found that differentiation strategies in the growth phase have a positive impact on performance persistence. Choi (2018) empirically analyzes the effect of advertising expenditure on firm value according to a firm's life cycle. The results show that advertising expenditure in the growth stage has a positive effect on firm value, while advertising expenditure in the decline stage has a relatively negative effect on firm value compared to other life cycles. As we can see, the relevance of firm value and credit ratings varies across the firm life cycle, depending on the study and objective.

Based on previous studies, we categorized a firm's life cycle into growth, maturity, and decline. Porter's (1980) competitive strategy is divided into product and cost leadership strategies. A differentiation strategy is a strategy to achieve competitive advantage by producing services and products that are differentiated from competitors; therefore, it is necessary to conduct research and development to apply design and innovation technology and advertising activities to promote products. On the other hand, the cost advantage strategy is a strategy to achieve competitive advantage by reducing costs and tries to reduce costs through the efficient use of appropriate facilities that can realize economies of scale and learning effects from experience curves. In general, a cost advantage strategy is appropriate when the market is highly competitive, and a differentiation strategy is appropriate when the market is not highly competitive (Durand & Coeurderoy, 2001). Therefore, a differentiation strategy is appropriate for firms in the growth stage because the R&D of differentiated services and products is important and there is not much competition in the market, and a cost advantage strategy is appropriate for firms in the decline stage because it is difficult to increase profitability due to high competition in the market (Choi, 2018). As such, it is important for firms in the growth stage to expand their market share by increasing sales through competitive advantage from differentiation strategies, so that they can expect continuous sales performance through advertising and R&D to improve their products and corporate image (Won & Ryu, 2016).

As shown in previous studies, during the growth phase, firms focus on advertising and R&D to build brand assets to secure competitive advantage through differentiation strategies. Accordingly, Hribar and Yehuda (2007) find that in growth stages with high growth levels, investors respond to growth indicators as an important factor in valuing firms because they expect future profitability. This growth phase is characterized by rapidly increasing sales and market share gains as consumers become more aware of the product or service owing to brand assets, raising expectations of future growth potential and profitability. Despite the fact that the business life cycle can affect the impact of brand assets on firm valuation, this impact has never been studied. Therefore, the impact of brand assets on firm value is expected to be greater for growth-stage firms than for other life-cycle stages. Thus, we set Hypothesis 3 as follows:

***Hypothesis 3:***

The effect of brand assets on firm value varies over the life cycle of a firm.

Hypothesis 3 -1: The effect of BSTI inclusion on firm value is greater for firms in the growth stage than for firms in other stages of their life cycle.

Hypothesis 3 -2: Among the firms included in the BSTI, the effect of brand assets on firm value is greater for firms in the growth stage than for those in other stages of the firm life cycle.

During the growth stage, the differentiation strategy through brand assets can expand market share and increase product demand, which in turn increases operating cash flow inflows due to the continuous generation of earnings, thus improving future repayment capacity (Ahn, 2015). Accordingly, we expect growth-stage firms to have less uncertainty about their future repayment capacity than other lifecycle firms. For this reason, the impact of brand assets on credit ratings may also be influenced by the business life cycle, which has not been studied. Therefore, the effect of brand assets on credit ratings is also expected to be greater for firms in the growth stage, leading to Hypothesis 4, as follows:

Hypothesis 4: The effect of brand assets on credit ratings varies over a firm's lifecycle.

Hypothesis 4 -1: The effect of BSTI inclusion on credit ratings is greater for firms in the growth stage than for firms in other stages of their life cycle.

Hypothesis 4 -2: Among the firms included in the BSTI, the effect of brand assets on credit ratings is greater for firms in the growth stage than for those in other stages of the firm life cycle.

## 3. Research design

### *3.1. Research model.*

*3.1.1 Research model for hypothesis 1.* The research model used to analyze Hypothesis 1, whether brand assets have a positive effect on firm value, is an OLS model with firm value as a dependent variable, variables related to brand assets as independent variables, and variables known to affect firm value in previous studies as control variables (Anderson & Mansi, 2009; Anthony & Ramesh, 1992; Barth et al., 1998). Basically, we refer to the model described by Kim et al. (2019) and change or add dependent and explanatory variables to fit our study.

As control variables, we include in our model variables that have been used in the literature as possible factors affecting firm value and credit ratings. Total assets (SIZE) is included as a variable to control for firm size effects and potential ability to be a going concern, and unlike the other variables, it is not a ratio, but rather a logarithmic value due to its large value (Anderson & Mansi, 2009). Advertising expenditures (AD) and R&D expenditures (RD) are calculated by dividing them by sales, and are included as control variables because they can affect firm value and credit ratings as they are the mediators of brand assets (Kim et al., 2019). The debt-to-equity ratio (LEV) is an indicator of financial strength calculated by dividing total debt by total assets, and the higher the debt-to-equity ratio, the higher the firm value due to the leverage effect (Choi, 2018). In addition, return on assets (ROA) is a measure of a firm's profitability, and a more profitable firm is expected to be positive for its valuation and credit rating. We also include industry dummies (IND) and year dummies (YD) as we need to control for industry and year effects.

To test hypothesis 1-1 and hypothesis 1-2 in detail for hypothesis 1, we set up the model of Eqs. (1) and (2) as follows:

$$TQ = \beta_0 + \beta_1 DBSTI + \beta_2 SIZE + \beta_3 AD + \beta_4 RD + \beta_5 LEV + \beta_6 ROA + \sum YD + \sum IND + \epsilon \quad (1)$$

$$TQ = \beta_0 + \beta_1 BSTI + \beta_2 SIZE + \beta_3 AD + \beta_4 RD + \beta_5 LEV + \beta_6 ROA + \sum YD + \sum IND + \epsilon \quad (2)$$

Here, TQ: Tobin's Q (=(market value of equity + book value of liabilities)/total assets)
DBSTI: Dummy variable indicating whether the firm is included in the BSTI (=1 if the firm is included) (in the BSTI, 0 otherwise).
BSTI: Brand assets (=log of the sum of brand ratings).
SIZE: Firm size (=(development expense + R&D expenses)/sales)

*AD*: Advertising expenses (advertising expense/sales)
RD: R&D expenses (=(development expense + R&D expenses)/sales)
LEV: Leverage ratio (debt/total assets)
ROA: Return on assets (net income/total assets).
YD: Year dummy variables
IND: Industry dummy variables (based on the middle classification level of the Korean Standard) (Industrial Classification List)
$\epsilon$: Residuals

We used Tobin's Q as a proxy for firm value. If, as expected from hypothesis 1-1, firms that are included in the BSTI and have brand asset announcements are more valuable than firms that are not, the regression coefficient $\beta_1$ of the independent variable BSTI in Eq. (1) is expected to have a significantly positive value. Furthermore, if the higher the level of brand assets, the higher the firm value, as expected from hypotheses 1-2, the value of the regression coefficient $\beta_1$ of the independent variable BSTI in Eq. (2) is expected to be significantly positive.

*3.1.2 Research model for hypothesis 2.* Hypothesis 2 examined whether brand assets have a positive effect on credit ratings. We set up the model in Eq. (3) for hypothesis 2-1, and Eq. (4) for hypothesis 2-2. The models in Eqs. (3) and (4) are used by replacing the dependent variable with the credit rating score (CRS) in the models in Eqs. (1) and (2).

$$CRS = \beta_0 + \beta_1 DBSTI + \beta_2 SIZE + \beta_3 AD + \beta_4 RD + \beta_5 LEV + \beta_6 ROA + \sum YD + \sum IND + \epsilon \quad (3)$$

$$CRS = \beta_0 + \beta_1 BSTI + \beta_2 SIZE + \beta_3 AD + \beta_4 RD + \beta_5 LEV + \beta_6 ROA + \sum YD + \sum IND + \epsilon \quad (4)$$

Here, CRS: Credit rating score (KIS credit rating score provided by Nice Credit Rating)
DBSTI: Dummy variable indicating whether the firm is included in the BSTI (=1 if the firm is included) (in the BSTI, 0 otherwise).
BSTI: Brand assets (=log of the sum of brand ratings).
SIZE: Firm size (=(development expense + R&D expenses)/sales)
*AD*: Advertising expenses (advertising expense/sales)
RD: R&D expenses (=(development expense + R&D expenses)/sales)
LEV: Leverage ratio (debt/total assets)
ROA: Return on assets (net income/total assets).
YD: Year dummy variables
IND: Industry dummy variables (based on the middle classification level of the Korean Standard) (Industrial Classification List)
$\epsilon$: Residuals

In the model of Eqs. (3) and (4), CRS is the KIS credit rating score provided by the Nice Credit Rating. The KIS credit rating score is one of the most widely used credit ratings in South Korea. It is a credit rating calculated by combining a financial rating model with a default prediction model and is composed of a score from 1 to 10, with 10 being the highest rating. Excellent companies received a score closer to 1, and poor companies received a score closer to 10. To facilitate the interpretation of the empirical results, we scaled the reciprocal of the credit rating score by the sequence value, that is, we assigned a score of 10 to the firm with the highest credit score and a score of 1 to the firm with the lowest credit score.

As expected from hypothesis 2-1, if firms in the BSTI have higher credit ratings than firms not in the BSTI, the value of the regression coefficient of the independent variable DBSTI, $\beta_1$, is expected to be significant and positive. In addition, as expected from hypothesis 2-2, if the higher the level of brand

assets, the higher the credit rating, the higher the value of the regression coefficient $\beta_1$ of the independent variable BSTI is expected to have a significant positive value.

*3.1.3 Research model for hypothesis 3.* Hypothesis 3 examines whether the impact of brand asset on firm value differs by a firm's life cycle. To analyze this, after measuring the firm life cycle, we add the measured firm life cycle variable to the model in Eqs. (1) and (2) as well as an interaction variable with the variables related to brand assets. To test the detailed hypotheses 3, hypothesis 3-1 and hypothesis 3-2, we set up the model of Eqs. (5) and (6) below.

$$TQ = \beta_0 + \beta_1 DBSTI + \beta_2 LCG + \beta_3 DBSTI{*}LCG + \beta_4 SIZE + \beta_5 AD + \beta_6 RD + \beta_7 LEV + \beta_8 ROA + \sum YD + \sum IND + \epsilon \quad (5)$$

$$TQ = \beta_0 + \beta_1 BSTI + \beta_2 LCG + \beta_3 DBSTI{*}LCG + \beta_4 SIZE + \beta_5 AD + \beta_6 RD + \beta_7 LEV + \beta_8 ROA + \sum YD + \sum IND + \epsilon \quad (6)$$

Here, TQ: Tobin's Q (=(market value of equity + book value of liabilities)/total assets)
DBSTI: Dummy variable indicating whether the firm is included in the BSTI (=1 if the firm is included) (in the BSTI, 0 otherwise).
BSTI: Brand assets (=log of the sum of brand ratings).
LCG: Dummy variable indicating whether the firm is in the growth stage (= 1 if the firm is ingrowth stage of its firm life cycle and 0 otherwise)
SIZE: Firm size (=(development expense + R&D expenses)/sales)
*AD*: Advertising expenses (advertising expense/sales)
RD: R&D expenses (=(development expense + R&D expenses)/sales)
LEV: Leverage ratio (debt/total assets)
ROA: Return on assets (net income/total assets).
YD: Year dummy variables
IND: Industry dummy variables (based on the middle classification level of the Korean Standard) (Industrial Classification List)
$\epsilon$: Residuals

The firm life cycle variable is measured by year for each firm, calculating the current year's measure and the previous four years' measures and using the median of the five-year measure as the current year's measure. To measure the firm life cycle, we use the median of the five-year measure to control for volatility in each year, because it is difficult to control for special circumstances in a given year when using only the current year's measure (Anthony & Ramesh, 1992).

The yearly measures of the firm life cycle were selected based on a combination of Anthony and Ramesh (1992), DeAngelo et al. (2006), and Hribar and Yehuda (2007). We use quintiles for the sales growth rate, employee growth rate, capital expenditure growth rate, M/B ratio, and retained earnings-to-equity ratio. Because the growth stage is characterized by higher growth rates for sales, employees, capital expenditures, and M/B ratio variables, we assign a score of 1 to 5 from the top quartile for these variables. On the other hand, the retained earnings-to-equity ratio is lower during the growth stage, so we assign a score of 1 to 5 from the bottom quartile. We sorted the data based on the sum of the scores for each year of the five measurement indicators of each company from the lowest 5 to the highest 25 and then divided them into three quartiles (Won & Ryu, 2016). The sum of the measurement scores from 5 to 11 was classified as the growth stage, from 12 to 18 as the maturity stage, and from 19 to 25 as the decline stage. The criteria for determining the firm life cycle for each variable are shown in Table 1.

As expected in hypothesis 3-1, if the effect of BSTI inclusion on firm value is greater for growth stage firms than for other life cycle firms, the regression coefficient of the interaction variable DBSTI*LCG, $\beta_3$, have a significantly positive value. Furthermore, as expected in hypothesis 3-2, if the effect of the level of brand assets on firm value is greater for growth stage firms than for other life cycle firms, the regression coefficient of the interaction variable BSTI*LCG, $\beta_3$, is expected to have a significantly positive value.

*3.1.4 Research model for hypothesis 4.* Hypothesis 4 examines whether the impact of brand assets on credit ratings differs by firm lifecycle. We set up the model in Eq. (7) for hypothesis 4-1, and Eq. (8) for hypothesis 4-2. The models in Eqs. (7) and (8) are used by replacing the dependent variable with the credit rating score (CRS) in Eqs. (5) and (6).

$$CRS = \beta_0 + \beta_1 DBSTI + \beta_2 LCG + \beta_3 DBSTI{*}LCG + \beta_4 SIZE + \beta_5 AD + \beta_6 RD + \beta_7 LEV + \beta_8 ROA + \sum YD + \sum IND + \epsilon \quad (7)$$

$$CRS = \beta_0 + \beta_1 BSTI + \beta_2 LCG + \beta_3 DBSTI{*}LCG + \beta_4 SIZE + \beta_5 AD + \beta_6 RD + \beta_7 LEV + \beta_8 ROA + \sum YD + \sum IND + \epsilon \quad (8)$$

Here, CRS: Credit rating score (KIS credit rating score provided by Nice Credit Rating)
DBSTI: Dummy variable indicating whether the firm is included in the BSTI (=1 if the firm is included) (in the BSTI, 0 otherwise).
BSTI: Brand assets (=log of the sum of brand ratings).
LCG: Dummy variable indicating whether the firm is in the growth stage (= 1 if the firm is ingrowth stage of its firm life cycle and 0 otherwise)
SIZE: Firm size (=(development expense + R&D expenses)/sales)
*AD*: Advertising expenses (advertising expense/sales)
RD: R&D expenses (=(development expense + R&D expenses)/sales)
LEV: Leverage ratio (debt/total assets)
ROA: Return on assets (net income/total assets).
YD: Year dummy variables
IND: Industry dummy variables (based on the middle classification level of the Korean Standard) (Industrial Classification List)
$\epsilon$: Residuals

As expected from hypothesis 4-1, if the effect of BSTI inclusion on credit rating scores is higher for growth-stage firms than for other life-cycle firms, the regression coefficient of the interaction variable BSTI*LCG, $\beta_3$, is expected to have a significantly positive value. Furthermore, if the effect of the level of brand asset on credit rating score is higher for growth stage firms than for other life cycle firms, as expected in hypothesis 4-2, the regression coefficient of the interaction variable BSTI*LCG, $\beta_3$, is expected to have a significantly positive value.

## 4. Data and empirical results

### 4.1. Data and sample characteristics

The sample for this study was selected by collecting data on firms listed on the KOSPI and KOSDAQ from 2011 to 2019 that met the following conditions.

(1) Nonfinancial firms
(2) Firms that settled in December
(3) Firms without capital impairments

**Table 1.** Measurement of the firm life cycle.

| | Sales growth rate | Employee growth rate | Capital expenditure growth rate | M/B ratio | Retained earnings to equity ratio |
|---|---|---|---|---|---|
| Growth stage | High | High | High | High | Low |
| Maturity stage | Middle | Middle | Middle | Middle | Middle |
| Decline stage | Low | Low | Low | Low | High |

Sales growth rate = (sales in the current year - sales in the previous year)/sales in the previous year
Employee growth rate = (Number of employees in the current year–Number of employees in the previous year)/Number of employees in the previous year
Capital expenditure growth rate = (Property, plant, and equipment in the current year - Property, plant, and equipment in the previous year)/Property, plant, and equipment in the previous year
M/B ratio = Market value of equity in the current year/Book value of equity in the current year.
Retained earnings to equity ratio = Retained earnings in the current year/Total equity in the previous year.

(4) Firms in the same industry as those in the BSTI

(5) All data required for the analysis are available.

The data was collected through the Data Guide provided by Fn-Guide (Korean company), and all financial data for KOSPI and KOSDAQ firms do not require any additional permission to be used for research purposes.

To control for the effect of extreme values on the results, we winsorized the extreme values of each variable at the top and bottom 1% levels. In addition, because the firm life cycle measure requires four more years of data than the empirical analysis period, the firm life cycle was measured from 2007 to 2019 and used in the analysis. The final sample for this study comprises 8,529 firm-years, as shown in Table 2.

Table 3 presents the descriptive statistics for the main variables used in the empirical analysis.

Panel B in Table 3 shows the descriptive statistics for the sample in Hypotheses 2–4. First, the dependent variable, TQ, had a mean of 1.333 and a median of 1.037. There is a slight difference between the mean and median, indicating that there are a number of firms with very high market values of assets compared to book value. Another dependent variable, CRS, had a mean of 5.026 and a median of 5.000, showing little difference between the mean and median. Regarding the independent variable, DBSTI, the variable for whether a firm is included in the BSTI, has a mean of 0.133, indicating that 13.3% of all firms are included in the BSTI.

Table 4 presents the descriptive statistics of the main variables used in the empirical analysis by firm life cycle. First, based on the company's life cycle, the growth stage (LCG) consisted of 1,715 observations (20.1%), the maturity stage (LCM) consisted of 5,221 observations (61.2%), and the decline stage (LCD) consisted of 1,593 observations (18.7%). The dependent variable, TQ, was found to be highest in the growth stage and lowest in the decline stage, while CRS showed little variation over the firm's life cycle. Among the independent variables, DBSTI, a variable based on whether a firm is in the BSTI, is 13.3% in the growth stage, 12.8% in the maturity stage, and 14.7% in the decline stage, indicating that firms in the BSTI are evenly distributed across the life cycle.

Table 5 shows the Pearson's correlations between the main variables used in the regression analysis. The independent variable DBSTI, whether a firm is included in the BSTI or not, is positively correlated with the dependent variable CRS at the 1% level. On the other hand, the dependent variable, TQ, does not yield the expected results, which corresponds to a simple correlation analysis and needs to be further analyzed empirically through a multivariate regression analysis controlling for other variables. The variables TQ and the control variables SIZE, LEV, and ROA are negatively correlated, whereas AD and RD are positively correlated at the 1% level. However, the dependent variable CRS and the control variables SIZE, AD, and ROA are positively correlated, and RD and LEV are negatively correlated at the 1% level.

**Table 2.** Sample selection.

| Category | Firm-year |
|---|---|
| Non-financial firms listed in KOSPI and KOSDAQ market | 18,934 |
| (-) Firms that are not in the same industry as those included in the BSTI | (-) 5,671 |
| (-) Firms with capital impairment | (-) 1,013 |
| (-) Firms with missing data for firm life cycle calculation | (-) 3,276 |
| (-) Firms unable to collect financial data | (-) 445 |
| Final sample | 3,928 |

**Table 3.** Descriptive statistics.

| Variable | N | Mean | Standard Deviation | Minimum Value | Median | Maximum Value |
|---|---|---|---|---|---|---|
| TQ | 8,529 | 1.333 | 0.921 | 0.477 | 1.037 | 6.299 |
| CRS | 8,529 | 5.026 | 1.965 | 0.000 | 5.000 | 10.000 |
| DBSTI | 8,529 | 0.133 | 0.339 | 0.000 | 0.000 | 1.000 |
| SIZE | 8,529 | 8.347 | 0.643 | 7.226 | 8.219 | 10.508 |
| AD | 8,529 | 0.010 | 0.021 | 0.000 | 0.001 | 0.117 |
| RD | 8,529 | 0.036 | 0.084 | 0.000 | 0.006 | 0.593 |
| LEV | 8,529 | 0.433 | 0.204 | 0.063 | 0.438 | 0.887 |
| ROA | 8,529 | 0.005 | 0.101 | −0.438 | 0.021 | 0.216 |

**Table 4.** Descriptive statistics for the main variables by firm life cycle.

| Firm life cycle | N | Variables | Mean | Standard Deviation | Minimum Value | Median | Maximum Value |
|---|---|---|---|---|---|---|---|
| Growth stage (LCG) | 1,715 | TQ | 1.870 | 1.192 | 0.477 | 1.470 | 6.299 |
| | | CRS | 5.027 | 1.891 | 0.000 | 5.000 | 10.000 |
| | | DBSTI | 0.133 | 0.340 | 0.000 | 0.000 | 1.000 |
| | | SIZE | 8.312 | 0.574 | 7.226 | 8.214 | 10.508 |
| | | AD | 0.013 | 0.024 | 0.000 | 0.002 | 0.117 |
| | | RD | 0.055 | 0.111 | 0.000 | 0.013 | 0.593 |
| | | LEV | 0.450 | 0.196 | 0.063 | 0.457 | 0.887 |
| | | ROA | 0.016 | 0.110 | −0.438 | 0.028 | 0.216 |
| Maturity stage (LCM) | 5,221 | TQ | 1.298 | 0.843 | 0.477 | 1.033 | 6.299 |
| | | CRS | 5.004 | 1.987 | 0.000 | 5.000 | 10.000 |
| | | DBSTI | 0.128 | 0.334 | 0.000 | 0.000 | 1.000 |
| | | SIZE | 8.350 | 0.676 | 7.226 | 8.200 | 10.508 |
| | | AD | 0.010 | 0.021 | 0.000 | 0.001 | 0.117 |
| | | RD | 0.035 | 0.081 | 0.000 | 0.006 | 0.593 |
| | | LEV | 0.444 | 0.202 | 0.063 | 0.450 | 0.887 |
| | | ROA | 0.004 | 0.103 | −0.438 | 0.023 | 0.216 |
| Decline stage (LCD) | 1,593 | TQ | 0.867 | 0.385 | 0.477 | 0.795 | 6.299 |
| | | CRS | 5.097 | 1.973 | 0.000 | 5.000 | 10.000 |
| | | DBSTI | 0.147 | 0.354 | 0.000 | 0.000 | 1.000 |
| | | SIZE | 8.374 | 0.598 | 7.226 | 8.281 | 10.508 |
| | | AD | 0.007 | 0.017 | 0.000 | 0.000 | 0.117 |
| | | RD | 0.021 | 0.052 | 0.000 | 0.002 | 0.593 |
| | | LEV | 0.379 | 0.209 | 0.063 | 0.360 | 0.887 |
| | | ROA | −0.002 | 0.082 | −0.438 | 0.013 | 0.216 |

**Table 5.** Pearson correlation matrix.

| | TQ | CRS | DBSTI | SIZE | AD | RD | LEV | ROA |
|---|---|---|---|---|---|---|---|---|
| TQ | 1.0000 | | | | | | | |
| CRS | 0.001 | 1.0000 | | | | | | |
| DBSTI | −0.008 | 0.099 *** | 1.0000 | | | | | |
| SIZE | −0.229 *** | 0.069 *** | 0.410 *** | 1.0000 | | | | |
| AD | 0.193 *** | 0.128 *** | 0.323 *** | 0.080 *** | 1.0000 | | | |
| RD | 0.337 *** | −0.069 *** | −0.096 *** | −0.180 *** | 0.088 *** | 1.0000 | | |
| LEV | −0.108 *** | −0.712 *** | 0.054 *** | 0.266 *** | −0.155 *** | −0.112 0.0265 | 1.0000 | |
| ROA | −0.108 *** | 0.577 *** | 0.104 *** | 0.255 *** | 0.012 *** | −0.194 *** | −0.266 *** | 1.0000 |

Note) 1. The correlation coefficient was the Pearson correlation coefficient, sample size (N)=8,529.
2. ***, **, * means that the correlation coefficient is significant at 1%, 5%, 10% level (two-tailed test).

***4.2. Empirical results.*** Panel A in Table 6 shows the results of verifying hypothesis 1-1 using Eq. (1). The coefficient of the independent variable, DBSTI, on the dependent variable, TQ, was 0.136, significant at the 1% level. This supports hypothesis 1-1, which states that firms that publish brand asset values due to their inclusion in the BSTI have a higher firm value than firms that do not. Looking at the control variables, the coefficient of SIZE is significant and negative at the 1% level, while the coefficients of AD, RD, and LEV are significant and positive at the 1% level, as expected. However, the ROA coefficient is not statistically significant. It can be interpreted that the larger the firm size, the lower the firm value because the ratio of market value of equity to total assets is relatively lower for larger firms. In addition, the higher the debt ratio, the higher the firm value due to the leverage effect, and the higher the advertising and R&D expenses, the higher the firm value because firms have high growth and profitability when the level of advertising and R&D expenses are high.

Panel B in Table 6 shows the results of Eq. (2) used to test hypothesis 1-2. In the model with TQ as the dependent variable, the coefficient of the independent variable BSTI was 0.285, which was significantly positive at the 1% level. This supports hypothesis 1-2, which states that higher levels of brand assets increase firm value due to the increased growth potential and profitability of brand assets. These results about the hypothesis 1-1 and 1-2 are consistent with previous studies to find the result of the relationship between brand assets and firm value (Barth et al., 1998; Kim et al., 2019; Park, 2002; Simon & Sullivan, 1993).

**Table 6.** Regression results for hypothesis 1-1 and 1-2.

| | | Dependent variable: TQ | | | |
|---|---|---|---|---|---|
| | | Panel A | | Panel B | |
| Independent variable | Predicted sign | Coefficient | t-value | Coefficient | t-value |
| (Constant) | +/− | 3.279 | 22.311 | 1.336 | 3.934 |
| DBSTI | + | 0.136*** | 4.323 | | |
| BSTI | + | | | 0.285*** | 2.937 |
| SIZE | − | −0.301*** | −17.466 | −0.175*** | −4.113 |
| AD | + | 4.334*** | 8.887 | 0.795 | 0.895 |
| RD | + | 2.641*** | 22.987 | 2.083** | 2.496 |
| LEV | + | 0.214*** | 4.272 | 0.418*** | 2.924 |
| ROA | + | −0.014 | −0.147 | 3.800*** | 9.969 |
| $\sum YD$ | | | Included | | |
| $\sum IND$ | | | Included | | |
| F-value | | 65.771*** | | 19.408*** | |
| Adjusted-$R^2$ | | 0.263 | | 0.423 | |
| N | | 8,529 | | 1,129 | |

Note) 1. ***, **, * means that the correlation coefficient is significant at 1%, 5%, 10% level (two-tailed test).

**Table 7.** Regression results for hypothesis 2-1 and 2-2.

| | | Dependent variable: CRS | | | |
|---|---|---|---|---|---|
| | | Panel A | | Panel B | |
| Independent variable | Predicted sign | Coefficient | t-value | Coefficient | t-value |
| (Constant) | +/− | 4.474 | 22.502 | 3.993 | 7.641 |
| DBSTI | + | 0.229*** | 5.376 | | |
| BSTI | + | | | 0.364** | 2.441 |
| SIZE | − | 0.403*** | 17.283 | 0.298*** | 4.533 |
| AD | + | −1.081 | −1.638 | 1.691 | 1.237 |
| RD | + | −1.066*** | −6.854 | −2.721** | −2.119 |
| LEV | + | −6.351*** | −93.707 | −5.393*** | −24.527 |
| ROA | + | 6.772*** | 50.927 | 11.840*** | 20.186 |
| $\sum YD$ | | | Included | | |
| $\sum IND$ | | | Included | | |
| F-value | | 432.347*** | | 64.164*** | |
| Adjusted-$R^2$ | | 0.704 | | 0.716 | |
| N | | 8,529 | | 1,129 | |

Note) 1. ***, **, * means that the correlation coefficient is significant at 1%, 5%, 10% level (two-tailed test).

Panel A in Table 7 shows the results of the analysis using Eq. (3) to test hypothesis 2-1. In the model with CRS as the dependent variable, the coefficient of the independent variable DBSTI was 0.229, which was significant and positive at the 1% level. This suggests that inclusion in the BSTI has a positive effect on credit ratings because firms whose brand asset values are disclosed due to inclusion in the BSTI have increased cash flows from higher profitability due to brand loyalty and price premiums, supporting hypothesis 2-1. Looking at the control variables, the coefficients of SIZE and ROA were significant and positive at the 1% level, as expected. The coefficients of RD and LEV are negative and significant at the 1% level, as expected, while the coefficient of AD has a negative sign but is not statistically significant.

Panel B in Table 7 presents the regression results for Eq. (4) to test hypothesis 2-2. In the model with CRS as the dependent variable, the regression coefficient of the independent variable, BSTI, was 0.364, which was significant and positive at the 5% level. This suggests that a higher level of brand assets has a positive effect on credit ratings because it provides a competitive advantage in the market, which significantly increases sales and profits, and the resulting cash inflows increase the ability to repay debt, which supports hypothesis 2-2. These results are consistent with Anderson and Mansi (2009) and Jeon et al. (2012), who examined the relationship between consumer satisfaction and credit ratings.

Panel A in Table 8 presents the regression results for Eq. (5) to test hypothesis 3-1. In the model with TQ as the dependent variable, the coefficient of the interaction variable DBSTI*LCG was 0.171, which was significant and positive at the 1% level. This suggests that the effect of BSTI inclusion on firm value is greater for growth firms than for other life cycle firms because the growth stage is a period of high sales growth and market share expansion. Therefore, future growth potential and sustainable operating performance are expected. This supports hypothesis 3-1.

**Table 8.** Regression results for hypothesis 3-1 and 3-2.

| | | Dependent variable: TQ | | | |
|---|---|---|---|---|---|
| | | Panel A | | Panel B | |
| Independent variable | Predicted sign | Coefficient | t-value | Coefficient | t-value |
| (Constant) | +/− | 3.187 | 22.348 | 2.075 | 5.455 |
| DBSTI | + | 0.102*** | 3.094 | | |
| DBSTI*LCG | + | 0.171*** | 2.722 | | |
| BSTI | + | | | 0.185* | 1.792 |
| BSTI*LCG | + | | | 0.354** | 2.115 |
| LCG | + | 0.477*** | 20.642 | 0.383*** | 6.898 |
| SIZE | − | −0.284*** | −16.938 | −0.150*** | −3.585 |
| AD | + | 3.908*** | 8.235 | 0.446 | 0.512 |
| RD | + | 2.440*** | 21.811 | 2.095** | 2.562 |
| LEV | + | 0.056 | 1.133 | 0.256* | 1.808 |
| ROA | + | −0.297*** | −3.088 | 3.269*** | 8.581 |
| $\sum YD$ | | | Included | | |
| $\sum IND$ | | | Included | | |
| F-value | | 77.923*** | | 20.516*** | |
| Adjusted-$R^2$ | | 0.307 | | 0.448 | |
| N | | 8,529 | | 1,129 | |

Note) 1. ***, **, * means that the correlation coefficient is significant at 1%, 5%, 10% level (two-tailed test).

**Table 9.** Regression results for hypothesis 4-1 and 4-2.

| | | Dependent variable: CRS | | | |
|---|---|---|---|---|---|
| | | Panel A | | Panel B | |
| Independent variable | Predicted sign | Coefficient | t-value | Coefficient | t-value |
| (Constant) | +/− | 4.461 | 22.457 | 4.995 | 8.376 |
| DBSTI | + | 0.156*** | 3.384 | | |
| DBSTI*LCG | + | 0.360*** | 4.128 | | |
| BSTI | + | | | 0.235 | 1.457 |
| BSTI*LCG | + | | | 0.497* | 1.891 |
| LCG | + | 0.039 | 1.221 | 0.227*** | 2.607 |
| SIZE | − | 0.409*** | 17.525 | 0.317*** | 4.821 |
| AD | + | −1.331** | −2.014 | 1.495 | 1.095 |
| RD | + | −1.081*** | −6.939 | −2.639** | −2.060 |
| LEV | + | −6.383*** | −93.369 | −5.491*** | −24.731 |
| ROA | + | 6.708*** | 50.093 | 11.532*** | 19.314 |
| $\sum YD$ | | | Included | | |
| $\sum IND$ | | | Included | | |
| F-value | | 416.323*** | | 62.107*** | |
| Adjusted-$R^2$ | | 0.705 | | 0.718 | |
| N | | 8,529 | | 1,129 | |

Note) 1. ***, **, * means that the correlation coefficient is significant at 1%, 5%, 10% level (two-tailed test).

Panel B in Table 8 shows the regression results for Eq. (6) to test hypothesis 3-2. In the model with TQ as the dependent variable, the coefficient of the interaction variable BSTI*LCG was 0.354, which was significant and positive at the 5% level. This supports hypothesis 3-2, which states that the effect of the level of brand assets on firm value is greater for firms in the growth stage than for firms in other stages because they are expected to gain a competitive advantage through differentiation strategies, leading to sustained profitability growth. These findings are consistent with prior research that brand assets may impact a firm differently over the business life cycle, especially during growth phases (Choi, 2018; Hribar & Yehuda, 2007; Won & Ryu, 2016).

Panel A in Table 9 presents the regression results for Eq. (7) to test hypothesis 4-1. In the model with CRS as the dependent variable, the coefficient of the interaction variable DBSTI*LCG was 0.360, which was significant and positive at the 1% level. This supports hypothesis 4-1, which states that the effect of BSTI inclusion on credit ratings is greater for growth firms than for other life cycle firms because the growth stage is a time of high revenue growth and market share expansion. Therefore, high growth and profitability are expected to increase future cash flows.

Panel B in Table 9 presents the regression results for Eq. (8) to test hypothesis 4-2. In the model with CRS as the dependent variable, the coefficient of the interaction variable BSTI*LCG between the brand asset level variable and the growth stage dummy variable was 0.497, which was significant and positive

at the 10% level (p = 0.059). This result is due to the fact that during the growth stage, the firm's competitive advantage based on its differentiation strategy is expected to increase market share and generate sustainable revenues, resulting in future cash inflows and an increased ability to repay debt. Therefore, this result supports hypothesis 4-2, which states that the effect of brand asset level on credit ratings is greater for growth-stage firms than for other lifecycle firms. These findings are also consistent with previous research that brand assets may affect firms differently over the business life cycle (Choi, 2018; Hribar & Yehuda, 2007; Won & Ryu, 2016).

## 5. Conclusion

This study empirically analyzes the effect of brand assets on firm value and credit ratings. In addition, we categorize the life cycle into growth, maturity, and decline stages according to the economic characteristics and development process of the firm to verify the moderating effect of a firm's life cycle on the effect of brand assets on firm value and credit rating.

Analyzing a sample of 8,529 company-years from 2011 to 2019, the results are as follows: First, we find that higher levels of brand assets have a significantly positive effect on firm value. This is because it shows that a brand asset is a long-term asset for a firm that regularly generates revenue and continues to have differentiating value. Therefore, investors recognize brand assets as important assets of a firm, which is interpreted as an increase in growth potential and profitability, resulting in a higher firm value.

Second, we find that higher brand asset levels have a significantly positive effect on credit ratings. This is interpreted as the result of the fact that the brand asset, which is recognized as a core business activity that should be continuously pursued to ensure sustainable competitiveness, is valued higher because it reduces consumer price sensitivity and generates higher profits at a premium price, thereby increasing cash flows.

Third, we find that the effect of brand assets on firm value is greater for growth-stage firms than it is for other lifecycle firms. This is interpreted as a result of the fact that a firm's brand asset in the growth phase has a greater effect on its valuation than in other life cycles because of the expectation of future growth potential and sustainable operating performance, as the growth phase is a time when a firm's management strategy can gain a competitive advantage by implementing differentiation strategies, resulting in rapid sales growth and market share expansion.

Fourth, we find that the effect of brand assets on credit ratings is greater for growth-stage companies than for other life cycle companies. This means that during the growth stage, a company with a high proportion of intangible assets such as brand assets has a greater effect on its credit rating than in other life cycles because its future operating performance is higher and the demand for its products increases due to the expansion of market share, which reduces uncertainty about its ability to repay future debt through continuous revenue generation and cash inflows.

One of the contributions of this study is that this study verifies the effect of brand asset on credit ratings, a comprehensive outcome that reflects a firm's internal and external information, which has not been verified until now. This is the first analysis of how the effect of brand assets on firm value and credit ratings varies over a firm's life cycle. This confirms that brand assets are not recognized in financial statements under current accounting standards but are a core competency of an organization as a source of future revenue and value creation. This suggests that standard-setters should recognize the disconnect between historical cost and firm value, as reported in financial statements, and redefine the standards for financial reporting.

A limitation of this study is that the BSTI was calculated by aggregating all brands owned by the same firm. For a more accurate analysis, it is recommended to use a weighted average considering the industry and business structure, but there are no specific criteria for this. In the future, there should be a reasonable standard such as a weighted average across multiple brands.

## Authors' contributions

Mi-Young Shin has contributed to the conception, analysis and the drafting of the paper as a first author. Kyunbeom Jeong has contributed to the design, interpretation of the data, revising the paper critically for intellectual content,

and the final approval of the version to be published as a corresponding author. All authors agree to be accountable for all aspects of the work.

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## Data availability statement

Data are available upon request from the authors.

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