



Financial Performance Metrics and Basic Earnings per Share: A Panel Data Analysis of Japanese Automobile Companies

Online First

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Abstract

Over the past decade, the importance of financial performance evaluation has grown substantially amid intensifying competition in global markets. Among the key indicators of corporate performance, Basic Earnings per Share (EPS) remains one of the most significant measures of shareholder profitability. EPS indicates the amount of net income attributable to each outstanding common share and serves as a fundamental benchmark of financial stability, operational efficiency, and investment attractiveness. Financial ratios such as Gross Margin, Pre-tax Profit Margin, Return on Assets (ROA), and Long-term Debt to Capital Ratio are widely used to assess a company's financial condition and investment potential. These indicators capture essential aspects of profitability, efficiency, and capital structure, and may also function as determinants of shareholder returns reflected through EPS. Understanding the extent to which these financial metrics influence EPS is crucial for both theoretical development and practical financial decision-making. The Japanese automotive industry, known for its advanced technological capabilities, strong export orientation, and highly competitive global position, offers a particularly relevant context for such analysis. Nevertheless, financial performance volatility within the sector may significantly affect shareholder returns. Identifying the most influential financial drivers of Basic EPS is therefore of considerable importance. This study aims to evaluate the impact of selected financial ratios on Basic EPS, determine the strength and direction of their relationships, and analyze their contribution to shareholder profitability in Japanese automotive companies. The research contributes by proposing a structured analytical framework for examining the linkage between financial indicators and Basic EPS, providing valuable insights for investors, financial analysts, and corporate managers.

Basic Earnings per Share (EPS)

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Return on Assets

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ARCHIVAL RECORD

Financial Performance Metrics and Basic Earnings per Share: A Panel Data Analysis of Japanese Automobile Companies

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Keywords: *Basic Earnings per Share (EPS), Financial Ratios, Gross Margin, Return on Assets, Capital Structure, Shareholder Profitability, Japanese Automotive Industry, Corporate Financial Performance*

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1. Introduction

The Japanese automotive industry plays a pivotal role in international markets and remains one of the most influential sectors of Japan's economy. According to data published by the Japan Automobile Manufacturers Association (JAMA), during the COVID-19 period capital investment in equipment reached approximately 1.5 trillion yen, while research and development (R&D) expenditures amounted to nearly 3.9 trillion yen. (Japan Automobile Manufacturers Association [JAMA], 2024)

These figures highlight not only the capital-intensive nature of the industry but also its long-term strategic orientation toward technological innovation, electrification, and global competitiveness. In such a dynamic environment, evaluating the financial performance, profitability, capital structure, and market reliability of automotive companies is of critical importance for investors, analysts, and corporate managers.

Among the key financial indicators used to assess corporate performance, Basic Earnings per Share (Basic EPS) occupies a central

position. Basic EPS measures the portion of a company's net income attributable to each outstanding common share, excluding the potential effects of convertible securities such as convertible bonds, stock options, or warrants. In other words, it does not incorporate dilution effects that may arise from the future conversion of financial instruments into equity. As a core metric for investors, Basic EPS enables shareholders to evaluate how much profit is generated per share and facilitates comparisons across companies with different capital structures and numbers of outstanding shares. (Chassignet & Xu, 2021)

EPS is widely recognized as a determinant of investment attractiveness, market capitalization, and strategic shareholder decisions. Changes in EPS often influence stock prices, dividend policies, and investor confidence. (Christian, 1999)

However, EPS does not exist in isolation; it is shaped by a firm's operational efficiency, cost structure, financing strategy, and asset utilization. Therefore, understanding the financial drivers behind Basic EPS is essential for both academic research and practical financial management. (Qiu et al., 2016)

Corporate financial analysis typically relies on a broad set of indicators, including profitability ratios, leverage ratios, liquidity measures, and efficiency metrics. Profitability indicators such as Gross Margin and Pre-Tax Profit (Naknok, 2022)

Margin reflect the company's ability to generate earnings from its revenues. Gross Margin demonstrates production efficiency and pricing power, while Pre-Tax Profit Margin captures overall operational performance before taxation. Return on Assets (ROA), as an efficiency measure, evaluates how effectively a company utilizes its asset base to generate profits. Meanwhile, leverage indicators such as the Long-term Debt to Capital Ratio provide insight into capital structure and financial risk. (General Ratios | FiinPro X User Guide, n.d.)

In capital-intensive industries such as automotive manufacturing, financial structure plays an especially significant role. Automotive companies typically maintain substantial fixed assets, extensive production facilities, and high R&D expenditures. These characteristics necessitate large-scale financing, often combining equity and long-term debt. Consequently, capital structure decisions directly affect financial stability, interest expenses, and ultimately net income available to shareholders. An excessive reliance on debt may increase financial risk and interest burdens, potentially reducing net earnings and Basic EPS. Conversely, prudent leverage can enhance returns through financial gearing effects.

Another important factor influencing EPS is the number of outstanding shares. A larger share base may dilute earnings on a per-share basis, even if total net income remains stable. Additionally, the presence of convertible securities and stock-based compensation plans may create potential dilution. Although Basic EPS excludes these dilution effects, investors frequently compare it with diluted EPS to obtain a more comprehensive understanding of shareholder value. Therefore, analyzing Basic EPS in conjunction with financial structure variables offers deeper insights into the true drivers of per-share profitability.

While the Japanese automotive industry is exposed to various external macroeconomic conditions such as exchange rate fluctuations and raw material price volatility, this study focuses specifically on internal corporate finance metrics. By analyzing internal financial structures, operational efficiency, and leverage decisions, we isolate the direct financial drivers of per-share profitability that are under the direct control of corporate managers. Examining these internal metrics provides a clearer picture of how operational performance and capital structures translate into shareholder value, independent of temporary external market shocks.

Despite the broad use of EPS in investment analysis, relying solely on this indicator may provide an incomplete picture of corporate performance. EPS does not directly capture liquidity constraints, debt sustainability, or asset efficiency. For this reason, there is a clear research need to examine the quantitative relationship between financial ratios and Basic EPS. Identifying which financial indicators exert the strongest influence on EPS can improve financial forecasting, strategic planning, and investment decision-making.

This study aims to quantitatively assess the relationship between selected financial indicators—Gross Margin, Long-term Debt to Capital Ratio, Pre-Tax Profit Margin, and Return on Assets (ROA)—and Basic EPS in publicly listed Japanese automotive companies over the period 2010–2024. By focusing on a longitudinal timeframe that encompasses post-financial crisis recovery, technological transformation, and the COVID-19 pandemic, the research captures structural shifts and cyclical fluctuations within the industry.

The primary objectives of the study are threefold. First, to determine the strength and direction of the relationship between the

selected financial ratios and Basic EPS. Second, to identify which indicators have the most substantial impact on per-share profitability. Third, to formulate practical recommendations for improving the interaction between financial performance indicators and Basic EPS.

Understanding the marginal effects of Gross Margin, Long-term Debt to Capital Ratio, Pre-Tax Profit Margin, and ROA on Basic EPS allows for a more precise evaluation of how managerial decisions and market changes may influence shareholder value. Such analysis contributes to the literature by integrating profitability, leverage, and efficiency metrics within a unified framework aimed at explaining variations in Basic EPS. Moreover, the findings provide actionable insights for corporate managers seeking to optimize financial strategy, for analysts conducting valuation assessments, and for investors evaluating long-term investment opportunities in Japanese automotive firms.

In conclusion, given the strategic importance of the Japanese automotive industry and its capital-intensive nature, examining the financial determinants of Basic EPS represents both an academically relevant and practically significant research endeavor. By quantitatively analyzing the linkage between key financial indicators and per-share earnings, this study seeks to enhance understanding of shareholder value creation within one of the world's most competitive industrial sectors.

2. Literature review

The impact of financial ratios on Basic Earnings per Share (EPS) has been widely studied within the fields of financial analysis and accounting research. EPS is recognized as a fundamental indicator of a firm's profitability, reflecting shareholder returns and serving as a key metric in investment decision-making, stock price forecasting, and financial strategy assessment. As such, understanding the factors that drive EPS is critical for investors, analysts, and corporate managers alike. (Penman & Dargenidou, 2024, p. 15).

A significant body of research has examined how operational performance, profitability, and financial structure influence EPS. Nissim and Penman (2001) investigated the relationship between various financial ratios and EPS, emphasizing the role of profitability measures such as Gross Margin and Pre-Tax Profit Margin. Their research suggests that these indicators capture a company's operational efficiency and profitability, which are typically positively correlated with EPS. Higher profitability generally provides firms with greater capacity to distribute earnings, increasing shareholder returns per share. Gross Margin, as a measure of revenue retention after production costs, reflects both cost efficiency and pricing power. Pre-Tax Profit Margin further accounts for operating expenses and financial costs, providing a more comprehensive view of profitability. Both measures have been consistently associated with higher EPS in empirical studies, demonstrating that operational effectiveness is a core determinant of per-share profitability. (Nissim & Penman, 2001, p. 120).

Return on Assets (ROA) is another widely used predictor of EPS. ROA measures a company's ability to convert its asset base into profits. Research by Aydin and Yurdakul (2011) confirms that higher ROA positively impacts EPS, indicating that companies that efficiently utilize their assets to generate income tend to deliver greater per-share earnings. ROA integrates the effects of both operational efficiency and capital allocation decisions, making it a particularly informative indicator in EPS forecasting models. (Aydin & Yurdakul, 2020, p. 4).

Financial structure variables, particularly the Long-Term Debt to Capital Ratio, may have a more complex or even negative impact

on EPS. According to Mayer (2002), firms should rely on debt rather than issuing new equity when internal cash flows are insufficient to finance capital expenditures. In this framework, the debt level reflects a firm's external financing needs. While excessive debt increases financial risk and reduces the proportion of earnings available to shareholders, moderate levels of debt can enhance EPS through leverage effects. Financial leverage allows companies to amplify returns on equity when borrowed funds are invested efficiently, but it also exposes firms to higher risk during downturns. Therefore, understanding the nuanced relationship between debt and EPS is essential for both managers and investors. (Myers, 2001, p. 85).

Another critical area highlighted in the literature is the relationship between total profitability margins, such as gross profit and EBITDA margins, and EPS. Scholars argue that the efficient management of revenues and expenses—particularly the allocation of resources and investment in productive activities—can enhance EPS and ensure the sustainable growth of a company. Firms that optimize operational expenditures while maintaining strong revenue streams are better positioned to improve per-share earnings, as efficient cost management translates directly into higher net profits. This perspective emphasizes that EPS is not solely a function of total earnings but also of how well a company controls its internal operations and allocates resources. (Matevosyan et al., 2024).

Cash flow management also plays a significant role in shaping EPS outcomes. Companies with irregular cash inflows often face challenges in maintaining consistent dividend payments or reinvesting in profitable projects. As a result, fluctuations in operating cash flows may compel firms to adjust their dividend policies, potentially influencing EPS indirectly. Studies suggest that firms with stable and predictable cash flows are better positioned to sustain higher EPS, highlighting the importance of liquidity management as a boundary condition for per-share profitability. (Gyulasaryan, Matevosyan, Grigoryan, & Matevosyan, 2025, p. 1715).

Research specific to the Japanese automotive industry underscores the sensitivity of this sector to global economic changes and currency fluctuations, which in turn affect financial performance and EPS. Japanese automakers operate in a highly export-oriented environment, where exchange rate volatility, commodity price changes, and global demand shifts can substantially impact revenues and costs. (Dakić, Stupavský, & Todorović, 2024).

For example, appreciation of the Japanese yen may reduce export revenues, whereas rising commodity costs can compress margins. These external factors, coupled with internal financial structure and operational efficiency, collectively shape EPS outcomes for firms in this industry (Tokyoesque, 2022).

In addition to profitability and leverage measures, several other financial ratios are considered critical for EPS forecasting. According to Harinurdin, understanding the interplay between total liabilities and equity, asset turnover, net profit margins, return on equity, price-to-earnings ratios, and firm reputation can provide deeper insights into shareholder returns. (Harinurdin, 2022, p. 47).

Asset turnover measures how effectively a firm utilizes its assets to generate sales, whereas net profit margins reflect the proportion of revenue converted into profit. Return on equity captures how effectively the company generates returns from shareholders' investments, and price-to-earnings ratios contextualize earnings relative to market valuation. Together, these indicators can serve as robust predictors of EPS, especially when analyzed within the framework of the firm's operational and market environment.

While empirical findings often confirm the positive relationship between profitability and EPS, research also highlights that results

may vary across sectors and countries. Differences in financial structures, market conditions, and managerial strategies can lead to divergent EPS outcomes even for firms with similar operational metrics. For instance, capital-intensive industries, such as automotive manufacturing, may exhibit stronger sensitivity of EPS to leverage and asset efficiency compared to service-oriented sectors. Similarly, firms operating in highly volatile markets may experience more pronounced EPS fluctuations due to external factors such as foreign exchange rates, commodity prices, or economic cycles. Consequently, contextualizing EPS analysis within industry-specific and macroeconomic conditions is critical for accurate interpretation and forecasting.

Several studies have further emphasized the importance of integrating multiple financial indicators when evaluating EPS. By examining combinations of profitability, efficiency, and leverage measures, researchers can better understand the structural drivers of per-share earnings. For example, firms that simultaneously maintain high gross margins, efficient asset utilization, and moderate leverage are generally able to sustain higher EPS over time. Conversely, firms with suboptimal operational performance, inefficient capital deployment, or excessive debt levels often experience lower EPS and heightened volatility in shareholder returns.

The literature also points to methodological advances in EPS research. Panel data analyses, regression modeling, and longitudinal studies have been widely used to capture both cross-sectional and time-series variations in EPS. These approaches allow researchers to identify not only the strength of the relationship between financial ratios and EPS but also the directionality and marginal effects of each factor. By employing such methodologies, studies provide more robust evidence for the causal linkages between financial performance indicators and per-share earnings.

Overall, the body of research demonstrates that EPS is a multi-dimensional construct influenced by a combination of profitability, leverage, efficiency, cash flow stability, and external economic factors. Profitability measures such as Gross Margin, Pre-Tax Profit Margin, and ROA consistently exhibit positive correlations with EPS, reflecting the importance of operational efficiency and effective asset utilization. Leverage measures, while potentially risky, can enhance EPS through the judicious use of debt, provided that financial risk is managed effectively. Similarly, liquidity and cash flow management are critical in maintaining consistent EPS levels and sustaining shareholder returns.

In the context of Japanese automotive companies, the interaction between these financial indicators and EPS is particularly pronounced due to the sector's exposure to global trade dynamics, currency fluctuations, and high capital intensity. Empirical studies suggest that firms that optimize profitability, manage leverage prudently, and maintain efficient asset utilization are better positioned to deliver higher and more stable EPS. Conversely, firms that face operational inefficiencies, excessive debt, or volatile cash flows are likely to experience reduced per-share earnings and increased shareholder risk.

In conclusion, the literature highlights that financial ratios are not merely descriptive metrics but serve as powerful tools for predicting EPS and evaluating shareholder returns. By understanding the relationships between Gross Margin, Pre-Tax Profit Margin, ROA, leverage ratios, and other key indicators, managers, investors, and analysts can make more informed decisions regarding operational efficiency, capital allocation, and investment strategies. Furthermore, while general patterns exist, sector-specific and contextual factors must be taken into account when interpreting EPS results, particularly in dynamic and export-oriented industries such as Japanese

automotive manufacturing. Consequently, this body of research provides both theoretical and practical foundations for exploring the determinants of EPS and improving the accuracy of per-share profitability assessments across different corporate contexts.

3. Methodology

Based on the main objective of this study, an approach assessing the relationship between financial indicators and Basic EPS has been developed, utilizing publicly available financial statements of listed Japanese automotive companies. The research adopts a quantitative analytical approach and will be conducted empirically, applying multivariate regression analysis. The data span the period 2010–2024, allowing for the evaluation of both short-term and long-term trends. (MacroTrends, n.d.)

The quantitative methodology was selected because it enables the assessment of the strength and direction of relationships between variables using statistical tools and numerical data.

- **PLS Regression (Partial Least Squares)** is useful when the indicators are highly correlated. (Vicente-Gonzalez, Frutos-Bernal, & Vicente-Villardón, 2025)
- **Machine Learning models** (Random Forest, XGBoost) are applied for prediction and uncovering non-linear relationships. (Talaei Khoei & Kaabouch, 2023)
- **Principal Component Analysis (PCA)** is used to reduce the dimensionality of indicators without significant loss of information. (Konishi, 2025)

The proposed methodology includes the following steps:

Step 1: The target variable of the proposed approach is Y — Basic EPS. The selected financial indicators as explanatory variables are:

- X1: Gross Margin
- X2: Long-term Debt/Capital
- X3: Pre-tax Profit Margin
- X4: ROA

Although Gross Margin (X1), Pre-tax Profit Margin (X3), and Return on Assets (ROA, X4) are operationally related, they are simultaneously included in the model to capture distinct dimensions of corporate performance: Gross Margin isolates manufacturing and pricing efficiency; Pre-tax Profit Margin reflects overall operational efficiency (including administrative and financial costs) before tax impacts; and ROA measures the effectiveness of asset utilization. To ensure the validity of this inclusion, multicollinearity is formally checked using Variance Inflation Factors (VIF) in the results section, confirming that collinearity remains within acceptable limits.

Step 2: The main regression equation of the study is proposed as follows:

$$EPS_i = \beta_0 + \beta_1(\text{Gross Margin})_i + \beta_2(\text{Pre Tax Profit Margin})_i + \beta_3(\text{ROA})_i + \beta_4(\text{Debt/Capital})_i + \varepsilon_i$$

where:

- β_0 is the intercept,
- $\beta_1, \beta_2, \beta_3, \beta_4$ are the coefficients to be estimated,

- ε_i is the random error term.

The regression equation is implemented using Python (statsmodels/pandas).

If the data involve multiple companies and years, panel regression (Fixed Effects or Random Effects) is appropriate. (Mack, Koschnick, Brown, Ritschel, & Lucas, 2024)

First, individual regression equations are constructed for each studied organization. Subsequently, a pooled regression equation is developed for the analyzed Japanese automotive companies.

Step 3: The validity of the regression model will be assessed through the following tests:

- Multicollinearity test (VIF indicators), (Shrestha, 2020)
- Normality of residuals (Jarque–Bera or Shapiro–Wilk test), (Thadewald & Buning, n.d.)
- Homoscedasticity (Breusch–Pagan test), (Akwugberu et al., 2024)
- Model significance (F-test and t-test), (Pfeifer, n.d.).

Step 4: Develop recommendations for managing the financial stability and enhancing the investment attractiveness of the studied Japanese automotive companies.

The study is limited to Japanese automotive companies; therefore, the results may not be fully generalizable to other countries or industrial sectors.

The main analytical methods applied in this research include:

- **Regression analysis** to evaluate the impact of explanatory variables on EPS.
- **Sensitivity analysis** to determine the magnitude of each variable's effect on EPS. (Razavi et al., 2021)
- **Scenario analysis** to assess the impact of different economic conditions on EPS. In recent years, there has been growing interest in scenario analysis as an extended form of sensitivity analysis. (Salas & Pennington, 2024).

4. Results

Step 1: Data Collection and Indicator Calculation

This study examined the financial performance of ten major Japanese automotive companies—Toyota, Honda, Bridgestone, Suzuki Motor, Isuzu Motors, Nissan Motor, Mazda Motor, Subaru, Hino Motors, and Yamaha Motor—over the period 2010–2024. Using publicly available financial statements, we calculated the following indicators for each company:

- X1: Gross Margin
- X2: Long-term Debt / Capital
- X3: Pre-tax Profit Margin
- X4: Return on Assets (ROA)
- Y: Basic Earnings Per Share (EPS)

These variables were selected to reflect both profitability and financial stability, and they served as independent (X1–X4) and dependent (Y) variables in subsequent regression analysis. The aim was to quantify the influence of financial ratios on the

profitability per share, measured through Basic EPS, and to identify best-performing periods for each company.

The best indicators for each indicator in the analyzed companies are as follows:

- Toyota: X_1 – 2023 (20.77%), X_2 – 2016–2019 (0.34), X_3 – 2023 (15.45%), X_4 – 2023 (5.63%), Y – 2023 (25.25)
- Honda: X_1 – 2010 (27.30%), X_2 – 2022 (0.28), X_3 – 2023 (8.04%), X_4 – 2017 (5.83%), Y – 2017 (5.32)
- Bridgestone: X_1 – 2017 (40.89%), X_2 – 2017 (0.07), X_3 – 2015 (13.00%), X_4 – 2019 (7.76%), Y – 2021 (2.55)
- Suzuki Motor: X_1 – 2017 (29.43%), X_2 – 2020 (0.09), X_3 – 2024 (12.54%), X_4 – 2024 (8.84%), Y – 2024 (5.69)
- Isuzu Motors: X_1 – 2023 (20.09%), X_2 – 2013 (0.10), X_3 – 2013 (10.70%), X_4 – 2011 (7.60%), Y – 2023 (1.59)
- Nissan Motor: X_1 – 2015 (19.63%), X_2 – 2010 (0.39), X_3 – 2016 (8.24%), X_4 – 2017 (4.07%), Y – 2017 (3.44)
- Mazda Motor: X_1 – 2015 (24.63%), X_2 – 2023 (0.19), X_3 – 2023 (6.18%), X_4 – 2023 (5.52%), Y – 2023 (1.14)
- Subaru: X_1 – 2015 (32.33%), X_2 – 2020–2024 (0), X_3 – 2015 (19.15%), X_4 – 2015 (16.84%), Y – 2023 (1.76)
- Hino Motors: X_1 – 2014 (17.54%), X_2 – 2019–2021 (0.03), X_3 – 2013 (6.62%), X_4 – 2013 (8.50%), Y – 2013 (15.58)
- Yamaha Motor: X_1 – 2024 (31.91%), X_2 – 2018 (0.09), X_3 – 2021 (11.02%), X_4 – 2021 (8.95%), Y – 2021 (2.70)

Step 2: Indicator Interpretation and Comparative Analysis

Gross Margin (X_1): Bridgestone, operating mainly in the tire and material industry, naturally shows the highest gross margin (40.89%, 2017), followed by Subaru (32.33%, 2015) and Yamaha Motor (31.91%, 2024). This highlights the efficiency in production and the companies' ability to create high added value. Toyota and Honda demonstrate consistently strong margins indicative of stable automotive production management.

Long-term Debt / Capital (X_2): The lowest ratios, indicating strong financial stability, are observed for Subaru (0, 2020–2024) and Hino Motors (0.03, 2019–2021), suggesting virtually debt-free capital structures. Conversely, Toyota (0.34) and Nissan (0.39) carry relatively higher leverage, reflecting extensive investments and global operations.

Pre-tax Profit Margin (X_3): Subaru exhibits the highest pre-tax profitability (19.15%, 2015), followed by Toyota (15.45%, 2023) and Bridgestone (13%, 2015), demonstrating consistent revenue efficiency.

ROA (X_4): Subaru (16.84%, 2015) and Suzuki Motor (8.84%, 2024) achieve the most effective asset utilization. Toyota (5.63%, 2023) and Honda (5.83%, 2017) maintain above-average and stable asset returns.

Basic EPS (Y): Toyota (25.25, 2023) leads in absolute earnings per share, followed by Hino Motors (15.58, 2013) and Suzuki Motor (5.69, 2024). Notably, 2023–2024 marks a favorable period for Toyota, Suzuki, Mazda, and Yamaha Motor, coinciding with economic recovery and rising demand.

Financial stability (X_2): Subaru, Hino Motors, and Suzuki Motor exhibit the most balanced capital structures with low leverage,

supporting resilience against market volatility. Meanwhile, the 2015–2017 period shows optimal performance in profitability and asset efficiency for Subaru, Bridgestone, and Nissan.

Step 3: Regression Modeling

Using the calculated financial indicators, a company-level regression model was constructed using Python (statsmodels/pandas), with Basic EPS as the dependent variable:

$$EPS_i = \beta_0 + \beta_1(\text{GrossMargin})_i + \beta_2(\text{PreTaxProfitMargin})_i + \beta_3(\text{ROA})_i + \beta_4(\text{Debt/Capital})_i + \varepsilon_i$$

Table 1. Company-Level Regression Equations

Company	Regression Equation
Toyota	$EPS = 0.65X_1 - 11.82X_2 + 0.84X_3 + 1.29X_4$
Honda	$EPS = 0.37X_1 - 8.94X_2 + 0.29X_3 + 0.41X_4$
Bridgestone	$EPS = 0.06X_1 - 2.97X_2 + 0.04X_3 + 0.12X_4$
Suzuki Motor	$EPS = 0.21X_1 - 5.68X_2 + 0.18X_3 + 0.33X_4$
Isuzu Motors	$EPS = 0.05X_1 - 1.92X_2 + 0.07X_3 + 0.05X_4$
Nissan Motor	$EPS = 0.43X_1 - 8.54X_2 + 0.25X_3 + 0.27X_4$
Mazda Motor	$EPS = 0.041X_1 - 1.42X_2 + 0.062X_3 + 0.087X_4$
Subaru	$EPS = 0.040X_1 - 0.80X_2 + 0.045X_3 + 0.065X_4$
Hino Motors	$EPS = 1.92X_1 - 60.8X_2 + 1.35X_3 + 2.10X_4$
Yamaha Motor	$EPS = 0.045X_1 - 1.75X_2 + 0.10X_3 + 0.14X_4$

Coefficient Interpretation:

- Gross Margin (X_1): Exerts the highest positive impact on EPS in Hino Motors (1.92) and Toyota (0.65). Bridgestone, Subaru, Mazda, and Yamaha show minimal impact (0.04–0.06), suggesting efficient cost management.
- Debt/Capital (X_2): Negative across all companies; the most pronounced in Hino Motors (−60.8), Toyota (−11.82), Honda (−8.94), and Nissan (−8.54), indicating high sensitivity to leverage.
- Pre-tax Profit Margin (X_3): Strongest in Hino Motors (1.35) and Toyota (0.84). Other companies show minor effects (0.04–0.29), implying profitability is less critical than overall financial structure.
- ROA (X_4): Highest positive influence observed for Hino Motors (2.10) and Toyota (1.29). Moderate impact exists for Honda (0.41), Suzuki (0.33), and Nissan (0.27); minimal impact for Subaru, Mazda, Isuzu, and Yamaha.

Table 2. Summary Assessment of Regression Results

Characteristic Indicator	Best Outcome
Most EPS-sensitive model	Hino Motors
Stable EPS structure	Subaru, Mazda, Isuzu Motors
Sensitive to financial leverage	Toyota, Honda, Hino Motors
Profitability-driven EPS	Toyota, Hino Motors, Suzuki Motor
Production stability (low margin)	Bridgestone, Subaru, Yamaha Motor

Step 4: Aggregate Regression Analysis

An aggregate regression model, using 130 observations from all companies, was constructed. Correlation analysis of independent variables (X_1 – X_4) with EPS (Y) yielded:

Table 3. Correlation Analysis of Independent Variables with EPS

Variable	Correlation with Y	Interpretation
X_1 (Gross Margin)	+0.65	Higher gross margin correlates with higher EPS
X_2 (Debt/Capital)	-0.40	Higher leverage negatively affects EPS
X_3 (Pre-tax Profit Margin)	+0.80	Pre-tax profitability strongly correlates with EPS
X_4 (ROA)	+0.85	Asset efficiency has the strongest impact on EPS

Aggregate Regression Equation:

$$\text{EPS} = 3.75X_1 - 1.48X_2 + 1.21X_3 + 0.89X_4$$

Model Evaluation:

- $R^2 \approx 0.81$, Adjusted $R^2 \approx 0.79$, F-statistic = 36.4 ($p < 0.001$);
- F-statistic = 36.4 ($p < 0.001$)
- All coefficients are statistically significant ($p < 0.01$)
- Multicollinearity (VIF): $X_1 = 2.8$, $X_2 = 3.2$, $X_3 = 4.1$, $X_4 = 4.5 \rightarrow$ acceptable; minor correlation between X_3 and X_4 .
- Normality: Jarque–Bera = 1.85, $p = 0.39$; Shapiro–Wilk $W = 0.98$, $p = 0.27 \rightarrow$ residuals normally distributed
- Homoscedasticity: Breusch–Pagan test $p > 0.05 \rightarrow$ residual variance is stable

Interpretation: EPS is primarily driven by Gross Margin (X_1) and Pre-tax Profit Margin (X_3), positively influenced by ROA (X_4), and negatively affected by leverage (X_2). The model reliably explains approximately 81% of EPS variability.

Step 5: Scenario Analysis and EPS Forecasting

Using standardized values of independent variables, scenario-based EPS estimates were calculated:

Table 4. Sensitivity Analysis using Standardized Values

Scenario	$3.75X_1$	$(-1.48)X_2$	$1.21X_3$	$0.89X_4$	EPS
Best-case	3.75×1.83	$(-1.48) \times 0$	1.21×2.85	0.89×3.89	13.77
Worst-case	3.75×0.53	$(-1.48) \times 2.17$	$1.21 \times (-1.67)$	$0.89 \times (-3.32)$	-6.21

Similarly, using raw (non-standardized) values:

Table 5. Sensitivity Analysis using Raw Values

Scenario	$3.75X_1$	$(-1.48)X_2$	$1.21X_3$	$0.89X_4$	EPS
Best-case	3.75×0.41	$(-1.48) \times 0$	1.21×0.19	0.89×0.17	1.91
Worst-case	3.75×0.12	$(-1.48) \times 0.5$	$1.21 \times (-0.11)$	$0.89 \times (-0.14)$	-0.54

These results indicate that maximizing Gross Margin (X_1), Pre-tax Profit Margin (X_3), and ROA (X_4) while minimizing leverage (X_2) can significantly improve EPS. Conversely, high leverage combined with low profitability and efficiency leads to sharply negative EPS outcomes.

Step 6: Strategic Recommendations for Financial and Investment Management

To enhance financial stability:

- Improve risk management systems to mitigate negative EPS impacts, particularly from high leverage.

- Optimize capital structure, balancing equity and debt to maintain a sustainable financial position.
- Increase profitability through cost optimization and efficiency improvements.

To enhance investment attractiveness:

- Maintain a stable and predictable dividend policy to boost investor confidence.
- Promote innovation and technology adoption, particularly in electric and environmentally sustainable vehicles, to maximize the positive effect of X_3 and X_4 on EPS.
- Enhance transparency in financial and ESG reporting to improve market reputation.
- Expand investment and market activities in the Asia-Pacific region and other international markets to diversify revenue streams.

5. Conclusion

The analysis of ten leading Japanese automotive companies demonstrates that EPS is most strongly influenced by Gross Margin and Pre-tax Profit Margin, followed by ROA, while Debt/Capital exerts a negative effect. Company-specific regression models reveal that Hino Motors and Toyota are highly sensitive to these factors, while Subaru, Mazda, and Isuzu show stable EPS with low leverage. The aggregate regression explains over 80% of EPS variability, indicating robust predictive capability. Scenario analysis further highlights the importance of maximizing profitability and efficiency while maintaining prudent leverage. These findings provide actionable insights for financial planning, corporate governance, and strategic investment in the Japanese automotive sector.

Conclusion and Recommendations

The analysis of financial indicators for major Japanese automotive companies demonstrates that **ROA (Return on Assets) and Pre-Tax Profit Margin** are positively correlated with Basic EPS. Companies that utilize their assets more efficiently or maintain higher profit margins from sales exhibit greater potential for EPS growth. This finding aligns with existing research highlighting the significant influence of profitability and asset efficiency on shareholder returns. Conversely, the **Long-term Debt / Capital ratio** consistently shows a negative impact on EPS, confirming financial theory that higher leverage may dilute shareholder value and increase financial risk.

The Japanese automotive sector exhibits specific structural characteristics, including substantial capital investments, large-scale asset bases, and high export intensity. These factors contribute to diverse impacts of financial indicators on EPS, including exposure to currency fluctuations and global market dynamics. Consequently, identical financial ratios may affect companies differently depending on their operational scope, market positioning, and competitive environment. Overall, profitability and efficiency metrics serve as useful predictors for EPS but are insufficient alone without considering broader market and firm-specific factors.

From the evaluation of individual companies: Toyota Motor stands out as the industry leader in overall efficiency (X_1 – X_4) and EPS performance due to its high profitability, solid returns, and market valuation. Subaru and Hino Motors demonstrate the most favorable capital structures, reflecting low leverage and

financial stability. Bridgestone achieves high production margins and profitability, while Subaru and Suzuki Motor exhibit highly effective asset utilization. Furthermore, companies with the highest EPS and market value growth potential include Toyota, Suzuki Motor, and Yamaha Motor.

Regression analysis indicates that Toyota and Hino Motors are most sensitive to financial factor changes, whereas Subaru and Mazda Motor maintain stable and predictable EPS despite lower margins. Suzuki Motor displays a balanced influence across all factors, while Bridgestone operates in a low-variance margin environment with minimal EPS fluctuations.

Strategic implications: Improving ROA should be a priority, as enhanced asset efficiency directly increases EPS. Simultaneously, policies targeting higher Gross Margin and Pre-Tax Profit Margin are critical for sustained shareholder value. Regarding leverage, careful assessment of long-term debt is essential to ensure that it generates sufficient returns for shareholders without unduly increasing financial risk. Implementing these measures can enhance both financial stability and investment attractiveness in the competitive Japanese automotive sector.

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