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# *The Impact of Exchange Rate Fluctuations on the Stock Prices of Automotive Exporters: A Comparative Analysis of the United States and Germany*

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***Abstract.*** This paper examines the mechanism through which exchange rate fluctuations impact stock prices by comparing two major automotive export companies—Ford and BMW—from the United States and Germany. The study is based on stock price and exchange rate data from 2005 to 2024, employing time series regression methods to analyse their sensitivity to different exchange rates (e.g., USD/EUR, USD/JPY, etc.). The results reveal that Ford exhibits a significant positive response to exchange rate changes, particularly USD appreciation, indicating that its cost structure is highly sensitive to exchange rates. In contrast, BMW has significantly reduced the impact of exchange rate fluctuations on its stock prices through effective financial and operational hedging strategies. The study highlights the role of corporate hedging strategies and macroeconomic conditions in the exchange rate transmission process, contributing to empirical research on foreign exchange risk management for multinational corporations.

***Keywords:*** exchange rate fluctuations, stock price reactions, multinational corporations, automotive industry, risk hedging.

## 1. Introduction

### 1.1. Background

Exchange rate fluctuations are one of the core variables in the international financial system and have a profound impact on the operational performance of multinational enterprises and the performance of financial markets. Due to the complexity of stock trading markets and the asymmetric effect of exchange rate fluctuations on international trade, different industries respond differently to exchange rate fluctuations [1-2]. Industries like the automotive manufacturing sector operate on a global scale, and their export-oriented nature makes their stock prices particularly sensitive to exchange rate fluctuations. As the world's two largest automotive exporters, the United States and Germany rely heavily on overseas markets. Exchange rate fluctuations may increase

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uncertainty in revenues and costs, and exacerbate transaction risks, thereby suppressing exporters' expansion intentions and hindering the conclusion of long-term trade agreements [3]. However, current research primarily focuses on single-country or single-currency cases, neglecting the potential outcomes of firms operating under different market environments, regulatory frameworks, and macroeconomic variables. Additionally, the role of emerging market exchange rate risks and asymmetric transmission effects has not been sufficiently explored in the automotive industry.

### 1.2. Research objective

The primary objective of this study is to examine the impact of exchange rate fluctuations on the stock prices of automobile export firms in the United States and Germany and to compare the differences between the two countries. Specifically, this study focuses on the following three research questions. First, this paper will reveal how exchange rate fluctuations affect the stock prices of export-oriented automobile firms in the United States and Germany and briefly analyse the mediating role of the macroeconomic environment in this relationship. Based on this question, this paper further analyses whether the stock prices of automobile export firms in the two countries respond to exchange rate fluctuations in the same direction. Finally, this study will explore the transmission mechanisms underlying these effects to help readers better understand the causal relationship between exchange rate fluctuations and stock prices and clarify the specific transmission channels through which exchange rate fluctuations affect the stock prices of automobile export firms.

### 1.3. Research characteristics

To achieve the above objectives, this study adopts a cross-country comparative research method and an industry-specific analytical framework, differing from existing literature that focuses on single countries or regions. The study selects the United States and Germany as sample countries due to their differing macroeconomic environments and policy frameworks and conducts comparative analysis based on exchange rate data from four countries (the United States, Germany, Japan, and China). This approach provides a new perspective on understanding the impact of exchange rate fluctuations on corporate stock returns. Additionally, the study selects Ford and BMW as representative and internationally renowned automotive export companies to provide empirical evidence for industry-specific research.

### 1.4. Research value

This study aims to fill the gap in existing industry research by focusing on the mechanism by which exchange rate volatility affects the stock prices of multinational automobile manufacturers. By combining macroeconomic analyses with financial market responses, the paper constructs a comprehensive analytical framework that ensures that both the immediate impact of exchange rate volatility on firms' earnings and its long-term strategic implications are examined. The paper also provides new insights into the impact of exchange rate volatility on firms' stock prices. This can be demonstrated specifically by comparing the stock price responses to exchange rate fluctuations of US and German automotive exporters. Finally, this study also examines the role of the macroeconomic environment and the policy framework in the impact of exchange rate volatility on the stock prices of automotive exporters, thus providing valuable insights and empirical data for policymakers and the automotive export industry.

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From a practical point of view, the results of this study can help automobile exporters to formulate more effective exchange rate risk management strategies, which are of great significance to their risk management. For investors, this study helps them understand the impact of exchange rate fluctuations on the stock prices of automobile export companies, thereby enabling them to make more informed investment decisions. Finally, the conclusions of this study have important implications for industrial policy formulation and corporate strategic adjustments in a globalised context, thereby assisting policymakers in maintaining the international competitiveness of the automobile industry.

### 1.5. Structure

The remainder of this article is organized as follows: Section 2 is a literature review, Section 3 outlines the research methodology, Section 4 discusses the findings and draws conclusions, and Section 5 concludes the article with key takeaways, implications and suggestions for future research.

## 2. Literature review

Exchange rate volatility is the upward and downward fluctuations in the external value of a currency, including depreciation and appreciation of a currency, that is, a change in its exchange rate or a change in the value of one currency relative to another. Many factors trigger exchange rate volatility, including political, economic and market factors [4]. Existing studies have established a relatively mature theoretical framework on the impact of exchange rate volatility on the share price of multinational firms. However, there is still a significant theoretical gap in the specific industry sector of automobile manufacturing, especially for comparative studies of export-oriented automobile firms in different countries. Based on this research background, this section will systematically review the existing literature from the following three dimensions: firstly, it will explore the underlying theoretical mechanism of exchange rate transmission; secondly, it will analyse the unique attributes of the automobile industry; and finally, it will point out the shortcomings of the existing studies. Through this multi-dimensional literature review, it will provide theoretical support and clarify academic contributions to this study.

### 2.1. Underlying theory

In terms of the theoretical framework, existing studies have mainly examined the issue from two complementary theoretical paths. The first theoretical path is rooted in the Exchange Rate Pass-Through Theory (EPT), a seminal study by Goldberg & Knetter, which shows that exchange rate fluctuations have a direct impact on firms' business performance through the "price competitiveness channel" [5]. A depreciation of the domestic currency reduces the price of foreign currency-denominated exports, thereby increasing the firm's competitive advantage in the international market, and vice versa. However, due to market imperfections (including monopoly power, government intervention and other factors), exchange rate changes may not be fully reflected in the final market price. This phenomenon is more pronounced in the automobile industry: an empirical study by Campa & Goldberg found that the degree of exchange rate pass-through varies according to the characteristics of the industry and that the exchange rate pass-through of import prices is on average only 50 per cent, or even lower in capital-intensive industries such as automobiles [6]. This is mainly due to the specific market pricing strategy of the automotive industry and its complex GVC network structure.

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The second important theory is based on the Foreign Exchange Exposure Model. The model takes a firm valuation perspective and states that exchange rate movements can affect share price performance by changing investors' expectations of future cash flows and discount rates of firms [7]. Foreign exchange risk exposure tends to be related to the level of external (trade and financial) activities as well as firm size. At the level of trading activities, export-oriented firms tend to exhibit greater exchange rate sensitivity [8]. And Allayannis & Ofek found that at the level of financial activities, the size of TNCs' foreign investment and financing is usually positively related to their foreign exchange risk exposure [9]. In addition, firm size has also been shown to be an important moderating variable. Studies have shown that many large firms usually have better risk management systems and a wider choice of hedging instruments and so can effectively reduce the impact of exchange rate volatility [10]. This theoretical framework provides the theoretical basis for this study to analyse the differential response of Ford and BMW share prices to exchange rate volatility.

It is worth noting that many studies in recent years have shown significant asymmetry in the impact of exchange rate volatility on firm value [11]. The asymmetry implies that the gain enhancement from local currency depreciation tends to be weaker than the loss caused by appreciation. In addition, the direction of asymmetry varies across industries. Campa et al. examined that in the manufacturing sector, firms adjust prices faster when the local currency exchange rate appreciates than when it depreciates, yet the primary products sector exhibits symmetry [12]. This suggests that asymmetric effects are also closely related to price stickiness. However, the asymmetric mechanism of exchange rate transmission in the automobile manufacturing industry and its influencing factors need to be further investigated due to the differences in the industrial chain layout of automobile firms in different countries [6].

### 2.2. Exchange rate sensitivity in the automotive industry

For automotive companies, changes in exchange rates are an invisible factor affecting their profit figures, and the industry is therefore perceptibly sensitive to exchange rate fluctuations. The main reason for this is related to the unique characteristics of the industry. First, the automotive industry is characterised by a global division of labour in the value chain, and its production involves a complex supply chain network that crosses the borders of several countries [13]. This is because the supply chain of the automotive manufacturing industry involves multiple links such as raw materials, parts, assembly and distribution. The process of sourcing parts, assembly and final sale for export may involve different national currencies, and multiple exchange rate fluctuations can affect company profits through the dual channels of cost transmission and revenue conversion. Second, the automotive industry is highly dependent on exports. In Germany, for example, cars and related parts and components are Germany's most important export products, accounting for 17% of German export revenues in 2023 [14]. Finally, the automotive industry is highly capital-intensive and its cross-border investment decisions are significantly affected by exchange rate fluctuations, with the appreciation of the local currency leading to an increase in the real cost of investing abroad. In the case of BMW, for example, China, its largest single sales market, has a slightly higher gearing ratio across the group than in previous years due to the depreciation of the RMB and the US dollar in 2023 [15]. However, most of the existing studies focus on the impact of exchange rates on car sales prices and less on their transmission mechanisms to the capital market.

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### 2.3. Existing research gaps

Existing studies have the following main limitations. Firstly, the vast majority of current studies adopt a country or currency perspective that is too homogeneous and fail to systematically examine the responses of automotive firms in different market environments. For instance, while Ito et al. explore in detail the impact of yen fluctuations on firms such as Toyota, they fail to explain the different patterns of responses that German or U.S. automotive firms may exhibit under similar exchange rate shocks [16]. Similarly, studies on corporate foreign exchange risk hedging, while seminal, have focused their samples on US firms and have failed to reveal the role of different national regulatory frameworks in shaping firms' risk management strategies [17].

Secondly, existing studies have paid significantly less attention to exchange rate risk in emerging markets. Although Hau & Rey proposed a mechanism for the impact of emerging market currency fluctuations on multinational firms, the study mainly focuses on the financial industry and does not fully consider the special operation mode of the automobile manufacturing industry in emerging markets [18]. In fact, with the rapid growth of automobile consumption in emerging markets such as China and India, the impact of currency fluctuations in these regions on global automobile enterprises has become increasingly prominent. For example, fluctuations in the RMB exchange rate not only affect the repatriation of profits by foreign automotive companies in China but also pass through the supply chain to the global production network, a complex mechanism that has not yet been fully understood.

Finally, there are shortcomings in the application of research on exchange rate transmission asymmetries in the automotive industry. The asymmetric transmission theory proposed by Burstein & Gopinath, while validated at the macro level, lacks a micro foundational analysis of the industry of automobiles [19]. Because asymmetry in the automotive industry is likely to have unique characteristics, its dynamic adjustment mechanism may need to be examined more closely.

## 3. Research methodology

### 3.1. Research design selection based on research questions and objectives

The primary research purpose is to examine the impact of exchange rate variations on the stock returns of automotive exporters from the United States and Germany, with particular emphasis on Ford and BMW. This study adopts a quantitative research design, notably applying time-series regression analysis to reach its purpose. Quantitative approaches are suitable in this context because they provide the precise measurement of correlations and the degree of influence between exchange rates and stock returns through numerical data analysis.

### 3.2. Data collection and sampling selection

#### 3.2.1. Sample selection

Ford and BMW were selected for this study as representative automotive exporters in the United States and Germany, respectively. They have significant market presence, extensive global operations, and substantial publicly available financial information.

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#### 3.2.2. Sources of data

The analyses utilised accurate historical stock prices of the firms and the exchange rates of each of the study countries over time, ensuring that the study had a reliable and extensive financial dataset.

#### 3.2.3. Data acquisition process

Data collection spanned from January 2005 to December 2024 to ensure the comprehensiveness of the data. The initial data were also meticulously pre-processed, including the elimination of anomalous data and the management of missing data, to improve the accuracy and reliability of the research results.

### 3.3. Variable definitions and measurement indices

#### 3.3.1. Independent variables

Exchange Rate Log Return: Determined by the difference in natural logarithms of the current day's closing exchange rate and the preceding day's rate. This metric standardizes rate variations to enhance comparability and statistical dependability.

Market Log Return: Defined as the natural logarithmic difference between the current and preceding day's market indices, effectively encapsulating daily market fluctuations.

#### 3.3.2. Dependent variable

Stock Price Log Return: Defined similarly to market log returns, it quantifies daily stock price fluctuations by logarithmic differences, hence providing a more precise representation of relative percentage changes compared to absolute differences.

The study rigorously follows conventional logarithmic return calculations to guarantee reliability and validity, as these methods are commonly endorsed in financial econometrics for reducing biases from varying pricing scales and heteroscedasticity in financial data.

### 3.4. Detailed explanation of analytical techniques

The main analytical approach used in this paper is regression analysis of time series data, considering both immediate and lagged effects of exchange rates (current, 1-period lag, 3-period lag and 5-period lag). This approach provides a clear representation of the time link and dynamics of exchange rate fluctuations on stock returns.

The analysis also builds a regression model for each company, using log exchange rate returns and log market returns as explanatory variables to differentiate the sensitivity of the company to macroeconomic factors. This approach improves the accuracy of the data reflection and can help readers to have a more comprehensive understanding of the different impacts between companies and currencies.

### 3.5. Software instruments and platforms

#### 3.5.1. Instruments used

Excel and Python were utilized for data preprocessing, regression modelling, and visualization.

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### 3.5.2. Advantages

Excel facilitates intuitive management of raw data, basic analysis, and ease of display, making it suitable for beginning investigations. Python facilitates advanced computational modelling, allowing for the automation of recurrent regression analysis, data cleansing procedures, and result verification.

### 3.5.3. Limitations

Excel's performance constraints and data-size restrictions required the incorporation of Python scripts for handling larger datasets. Python, although robust, necessitates programming proficiency and thorough debugging to guarantee precision, thus prolonging the research timetable.

## 4. Data analysis

Analyzed are daily stock returns and exchange rate fluctuations from January 2005 to December 2024 for two major multinational vehicle exporters—Ford (United States) and BMW (Germany). Descriptive statistics show very low mean values but significant daily return volatility, suggesting usual traits of financial market data. Such volatility emphasizes the notable possible effect of even small exchange rate changes on firm-level stock returns, especially for international companies much exposed to global currency changes.

Regression models were run to measure exchange rate exposure adjusting for contemporaneous and lagged general market returns (lags of 1, 3, and 5 days), following the methodological recommendations [7-9]. The regression models used follow the following general shape and closely fit current research.

### 4.1. Ford regression results (see table 1)

Regression studies indicated that Ford has considerable positive exposure mostly to the USD/EUR exchange rate, with a coefficient of +1.0879 ($p < 0.01$). Economically, this means that for every 1% appreciation of the USD versus the EUR, Ford's stock returns rise by about 1.09%, therefore indicating reduced Euro-denominated input prices that improve Ford's profitability. With a coefficient of +0.5542 ($p < 0.10$), Ford also exhibits notable positive sensitivity to the USD/YTL (U.S. Dollar/Turkish Lira). This outcome makes sense given Ford's large manufacturing presence in Turkey and implies cost savings from dollar appreciation in relation to the Lira.

On the other hand, Ford has a significant negative association with USD/JPY (U.S. Dollar/Japanese Yen), with a coefficient of -0.3982 ($p < 0.05$). This sensitivity probably results from rivalry among Japanese automakers, growing as the yen rises, hence heightening competitive cost benefits for Japanese companies. The rest of the exchange rate exposures were statistically insignificant, implying little direct economic consequences.

Though some exchange rates are important, Ford's total explanatory power ($R^2$) stays rather low (between 0.033 and 0.065). This suggests that while currency changes have clear effects, they account just a small percentage of the daily stock return variation. Presumably, other elements like industry dynamics or company-specific announcements have more impact.

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Table 1. Regression findings for Ford stock log return forecast

| Panel: Ford stock log return prediction | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| predictors | Ford stock log return | | Ford stock log return | | Ford stock log return | | Ford stock log return | | Ford stock log return |
| LSD/GBD log return | 0.3393 (0.368) | USD/EUR log return | 1.0879*** (0.333) | USD/YTL log return | 0.3982** (0.179) | USD/JYP log return | 0.5542* (0.331) | USD/CNY log return | 1.0753 (0.850) |
| LSD/GBD log return_lag1 | 0.2183 (0.372) | USD/EUR log return_lag1 | -0.0019 (0.329) | USD/YTL log return_lag1 | 0.0584 (0.178) | USD/JYP log return_lag1 | 0.2985 (0.337) | USD/CNY log return_lag1 | -0.5934 (0.854) |
| LSD/GBD log return_lag3 | 04016 (0.372) | USD/EUR log return_lag3 | 0.2392 (0.338) | USD/YTL log return_lag3 | 0.0082 (0.179) | USD/JYP log return_lag3 | 0.3664 (0.341) | USD/CNY log return_lag3 | 0.9537 (0.825) |
| LSD/GBD log return_lag5 | 0.3479 (0.374) | USD/EUR log return_lag5 | -0.0709 (0.335) | USD/YTL log return_lag5 | 0.2053 (0.178) | USD/JYP log return_lag5 | -0.2598 (0.340) | USD/CNY log return_lag5 | -1.5952* (0.839) |
| log market return | 0.0575 (0.0701) | log market return | -0.0709 (0.335) | log market return | 0.0205 (0.067) | log market return | 0.0239 (0.068) | log market return | 0.0294 (0.069) |
| log market return_lag1 | 0.0918 (0.071) | log market return_lag1 | 0.0308 (0.067) | log market return_lag1 | 0.1424* (0.067) | log market return_lag1 | 0.1356** (0.068) | log market return_lag1 | 61582* (0.069) |
| log market return_lag3 | 0.0615 (0.071) | log market return_lag3 | -0.0030 (0.067) | log market return_lag3 | 0.0084 (0.068) | log market return_lag3 | 0.0318 (0.069) | log market return_lag3 | 0.0356 (0.069) |
| log market return_lag5 | 0.0297 (0.071) | log market return_lag5 | 0.0229 (0.066) | log market return_lag5 | -0.0079 (0.067) | log market return_lag5 | 0.0242 (0.069) | log market return_lag5 | 0.0195 (0.069) |
| R-square | 0.033 | R-square | 0.065 | R-square | 0.050 | R-square | 0.049 | R-square | 0.056 |

Table 1 shows regression coefficients for Ford's stock log returns on several currency rates (USD/EUR, USD/YTL, USD/JPY, USD/CNY, USD/GBP), allowing for contemporaneous and lagged market returns. Errors in standard are given in brackets. Significance levels shown as follows: ($p < 0.10$; ** $p < 0.05$; *** $p < 0.01$).

## 4.2. BMW regression results (see table 2)

By comparison, regression studies show very little and mostly unimportant exchange rate exposure for BMW across looked at currencies (EUR/USD, EUR/CNY, EUR/CAD, EUR/RUB, and EUR/GBP). There was no statistical significance; contemporaneous coefficients were constantly near zero. The EUR/CNY exchange rate (-0.3340, lag 5, $p < 0.05$) also showed a delayed negative impact; so did the EUR/GBP exchange rate (-0.3585, lag 5, $p < 0.05$). These findings imply that BMW's competitive position worldwide could be gradually affected by market perceptions of continuous currency swings.

BMW's little total currency exposure stands in stark contrast to Ford's. BMW's proven hedging techniques—including financial derivatives (forwards and options) and operational hedges (matching foreign production costs to revenues)—probably effectively reduce exchange rate risks. This strong hedging system supports earlier research by proving that proactive risk management greatly lowers visible currency vulnerability [9].

With market return coefficients of 1.15 ($p < 0.01$) and strong explanatory power ($R^2$ between 0.557 and 0.574), the regression analyses show BMW's substantial susceptibility to general market

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changes. These results highlight BMW's stock performance as mostly driven by more general economic factors rather than particular currency changes.

Table 2. Regression results for BMW stock log return prediction

| Panel: BMW stock log return prediction | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| predictors | BMW stock log return | | BMW stock log return | | BMW stock log return | | BMW stock log return | | BMW stock log return |
| EUR/RUB log return | 0.0071 (0.073) | EUR/GBD log return | -0.0927 (0.170) | EUR/CAD log return | -0.2347 ( 0.157) | EUR/CNY log return | 0.0556 (0.151) | EUR/USD log return | 0.0975 (0.150) |
| EUR/RUB log return_lag1 | -0.0959 (0.073) | EUR/GBD log return_lag1 | -0.1109 (0.170) | EUR/CAD log return_lag1 | -0.2263 ( 0.158) | EUR/CNY log return_lag1 | -0.2528* (0.151) | EUR/USD log return_lag1 | -0.2887* (0.149) |
| EUR/RUB log return_lag3 | 0.0849 (0.072) | EUR/GBD log return_lag3 | 0.0638 (0.172) | EUR/CAD log return_lag3 | 0.0321 (0.158) | EUR/CNY log return_lag3 | 0.0667 (0.150) | EUR/USD log return_lag3 | 0.0403 (0.150) |
| EUR/RUB log return_lag5 | -0.0507 (0.073) | EUR/GBD log return_lag5 | -0.3585** (0.169) | EUR/CAD log return_lag5 | -0.3340** (0.158) | EUR/CNY log return_lag5 | -0.4434*** (0.149) | EUR/USD log return_lag5 | -0.3048** (0.150) |
| log market return | 1.1432*** ( 0.071) | log market return | 1.1557*** ( 0.072) | log market return | 1.1618*** ( 0.074) | log market return | 1.1573*** (0.073) | log market return | 1.1598*** (0.076) |
| log market return_lag1 | 0.0804 ( 0.072) | log market return_lag1 | -0.0630 (0.073) | log market return_lag1 | 0.0885 ( 0.074) | log market return_lag1 | 0.0345 (0.074) | log market return_lag1 | 0.0262 (0.076) |
| log market return_lag3 | 0.673 (0.071) | log market return_lag3 | 0.0452 (0.074) | log market return_lag3 | 0.0543 ( 0.074) | log market return_lag3 | 0.0431 (0.074) | log market return_lag3 | 0.0490 (0.076) |
| log market return_lag5 | 0.1022 (0.071) | log market return_lag5 | -0.0974 (0.073) | log market return_lag5 | 0.1163 (0.074) | log market return_lag5 | 0.0229 (0.074) | log market return_lag5 | 0.0395 (0.075) |
| R-square | 0.557 | R-square | 0.566 | R-square | 0.571 | R-square | 0.580 | R-square | 0.574 |

Note: Table 2 presents regression coefficients for BMW stock log returns on various exchange rates (EUR/USD, EUR/CNY, EUR/CAD, EUR/RUB, EUR/GBP), controlling for contemporaneous and lagged market returns. Errors standard in parentheses. Significance levels shown as follows: ($p < 0.10$; ** $p < 0.05$; *** $p < 0.01$). *

## 4.3. Comparative analysis and theoretical implications

The divergent outcomes for Ford and BMW provide significant insights into strategic management of exchange rate exposure. Ford's high positive exposures to USD/EUR and USD/YTL underscore the benefit enterprises with substantial foreign costs gain from home currency strengthening. On the other hand, Ford's exposure to USD/JPY emphasizes the intricacy of currency dynamics, in which competitive settings strongly influence sensitivity direction and size.

BMW's little vulnerability shows how well advanced financial and operational hedging techniques work for global companies to significantly offset theoretical currency risks. Such results support theoretical forecasts by Adler and Dumas, stressing that systematic hedging can hide natural currency sensitivities [20].

Given their significant possible effects on corporate valuation, especially for firms with poor hedging or large foreign cost exposures, these findings imply explicitly including exchange rate risks into valuation models.

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Furthermore, new studies show that exchange rates have to be viewed in light of larger macroeconomic factors including inflation, interest rates, trade policy, and geopolitical uncertainty. Such elements unavoidably interact with changes in currency, thereby underlining the need of several economic studies in properly comprehending and controlling financial dangers connected to currencies.

## 5. Conclusion

This study initially explores the significant differences in exchange rate exposure among multinational automobile exporters, emphasising that firm-specific strategies are the primary influencing factors. Initially, regarding the impact of exchange rate fluctuations on stock prices, by analysing Ford and BMW, two automotive companies, it was found that Ford exhibits significant positive exposure (USD/EUR), while BMW demonstrates extremely low sensitivity. The exposure differences between Ford and BMW indicate that while exchange rate changes naturally trigger financial concerns, robust financial and operational hedging techniques (as demonstrated by BMW) can significantly mitigate such risks. Moreover, this paper cites EPT theory and foreign exchange risk exposure models to explain the theoretical transmission pathways. This explains why Ford's stock price reacts strongly to exchange rate changes, primarily because USD appreciation reduces its overseas procurement costs, while BMW effectively cushions exchange rate risks through financial and operational hedging strategies. These findings underscore the importance of customised risk management techniques in international corporate finance, particularly emphasising that proactive hedging is a key tool for multinational enterprises to navigate global financial volatility.

Although this study provides new insights into the impact of exchange rate fluctuations on the stock prices of multinational automobile manufacturing companies at both empirical and theoretical levels, several limitations exist. First, in terms of the research sample, only two automotive companies, BMW and Ford, were selected for analysis, which may limit the generalisability of the conclusions. Future research could consider expanding the range of samples to include more representative international automobile brands on this basis. Thus, more general conclusions can be drawn by comparing the exchange rate sensitivity and market positioning of automobile companies in different countries.

In terms of research methodology, this paper has so far only used the logarithmic rate of return model for its analysis, and in the future, we can try to introduce econometric methods such as the vector autoregressive (VAR) model. Ismal and Bin Isa observed that this model is effective in capturing the interactions present in multivariate time series and is particularly suitable for analysing the dynamic association between exchange rates and share prices. In addition, besides the short-term stock price data that have been used so far, future research could also focus on long-term valuation metrics of firms (e.g., EV/EBITDA, P/B ratio, etc.) [21]. These indicators provide insights into the financial health of firms and the long-term impact of exchange rate fluctuations [22].

Finally, with regard to data collection, it must be acknowledged that the data currently collected are still relatively limited, leading to results that deviate from expectations. There is a need to expand the data sample size and time span in the future to improve the robustness of the findings. In addition to gaining a deeper understanding of the impact of the exchange rate, consideration could be given to extending the research perspective to other industries that are significantly affected by the exchange rate, such as the aerospace industry. Benassy-Quere et al. suggest that the aerospace industry is characterised by its large scale and technology intensity, and its exchange rate sensitivity is like that of other capital-intensive industries, so research in this area would also have a wide range of applications value [23]. Overall, by optimising the sample selection, improving the research

methodology and expanding the research field, future research will be able to reveal the impact of exchange rate fluctuations on export pricing in a more comprehensive and in-depth manner.

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