Proceedings of ICMRED 2025 Symposium: Effective Communication as a Powerful Management Tool
DOI: 10.54254/2754-1169/2025.BL24592

US Dollar Exchange Rate Fluctuations and Foreign Exchange Risk Exposure: Evidence from Chinese Foreign Trade Enterprises

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Abstract. Grounded in the theory of foreign exchange risk exposure and the capital market approach, this study investigates how fluctuations in the US dollar exchange rate affect stock returns of Chinese foreign trade enterprises. Using panel data from 23 representative firms among the top 100 Chinese foreign trade listed companies, covering the period from 2022 to February 2025, this paper constructs a fixed-effects panel regression model to empirically test the impact of US dollar exchange rate movements on individual stock performance. The results reveal two key findings. First, the selected companies exhibit significant exposure to US dollar risk, whereby an appreciation of the US dollar against the CNY leads to a notable decline in monthly stock returns. Second, the negative effects remain robust across various model specifications and variable settings. These findings underscore the substantial influence of exchange rate volatility on the financial performance of foreign trade companies in China. By identifying the sensitivity of firm-level returns to currency fluctuations, this paper provides valuable insights for corporate risk management and strategic decision-making. It offers practical implications for companies aiming to mitigate exchange rate risks and formulate more resilient international financial strategies in a highly volatile global market environment.

Keywords: Foreign Exchange Risk Exposure, Capital Market Approach, Foreign Trade Enterprises, Stock Return

1. Introduction

Since the collapse of the Bretton Woods system, the global monetary framework has been fundamentally restructured: the gold standard was phased out, and the floating exchange rate system became the dominant paradigm. Consequently, exchange rates have become increasingly volatile and unpredictable. Leveraging its central role in the international financial architecture, the United States has since maintained structural financial dominance over peripheral economies. As the global influence of the US dollar expanded, a currency network centered on the dollar gradually took shape[1]. According to data from the Society for Worldwide Interbank Financial Telecommunication (SWIFT), as of March 2025, the US dollar maintains its dominance in international financial transactions, accounting for 49.08% of global payments.

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In recent years, influenced by adjustments in the Federal Reserve's monetary policy and rising global economic uncertainty, the US dollar exchange rate has become highly volatile, emerging as a key external factor affecting the stable development of China's foreign trade enterprises. According to a report by the State Administration of Foreign Exchange, China's non-reserve financial account recorded a deficit in 2024, while foreign direct and securities investments remained active. By the end of 2024, China's foreign assets exceeded USD 10 trillion, with foreign liabilities nearing USD 7 trillion. As China's financial market continues to open up, the impact of exchange rate fluctuations on the capital market has grown more complex, underscoring the increasing importance of foreign exchange risk management. A thorough investigation into how US dollar exchange rate changes affect the foreign exchange risk exposure of Chinese foreign trade firms can not only enhance corporate risk management and international competitiveness, but also offer valuable guidance for refining government exchange rate policy.

Major international settlement currencies such as the US dollar on corporate foreign exchange risk exposure has always been an important topic in the field of international finance and trade. For example, Jorion used stock returns as a proxy variable for corporate value to study the relationship between exchange rate fluctuations and corporate value, and found that only 5.23% (15) of 287 multinational companies in the United States had significant foreign exchange risk exposure coefficients[2]. He and Ng used 171 Japanese multinational companies as a sample to study the relationship between stock returns and exchange rate fluctuations, and found that 26.32% (45) of the companies had significant foreign exchange risk exposure, and there was a significant positive correlation between the two variables[3].

It can be seen clearly that existing research on the impact of foreign exchange risk remains inconclusive and presents several limitations. First, most studies focus on developed countries, while empirical analyses of foreign trade enterprises in developing economies—particularly China—are relatively limited. Given the unique nature of China's capital market, its risk exposure characteristics may differ systematically from those in developed markets. Second, many studies examine only the direct relationship between exchange rate fluctuations and corporate value, without systematically controlling for key fundamental factors influencing risk exposure, such as firm size, valuation, profitability, and investment models.

In view of that, this study draws on foreign exchange risk exposure theory and examines monthly stock returns and fundamental data from 23 listed companies among China's top 100 foreign trade enterprises, covering January 2022 to February 2025. It incorporates the monthly USD/CNY exchange rate change to systematically assess the impact of exchange rate fluctuations, while further exploring firm size heterogeneity. Compared with existing literature, this paper offers the following marginal contributions: First, it selects a timely and representative sample by focusing on leading foreign trade firms in China and using recent data. Second, it incorporates four key fundamental factors influencing risk exposure—namely, the size factor (SMB), book-to-market ratio (HML), profitability (RMW), and investment model (CMA)—allowing for a more accurate isolation of the independent effect of USD exchange rate changes.

2. Theoretical basis, literature review and mechanism analysis

2.1. Theoretical basis

The capital market approach serves as a fundamental framework for evaluating corporate exposure to foreign exchange risk. Leveraging publicly available market data, this method facilitates straightforward variable acquisition and provides a holistic assessment of how exchange rate

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fluctuations affect firm value, thereby enjoying widespread application in empirical research. Rooted in the efficient market hypothesis, the approach assumes that exchange rate movements influence corporate cash flows, which are subsequently reflected in stock prices. Market participants respond by adjusting asset valuations, establishing a direct link between stock returns and exchange rate changes. Within this theoretical framework, Adler and Dumas (hereinafter referred to as the "AD model") proposed that foreign exchange exposure can be quantified by measuring the sensitivity of a firm's stock returns to exchange rate variations. Specifically, they define exposure as the extent to which a firm's stock value changes in response to a one-unit change in the exchange rate[4].

$$P = \alpha + bS + e \tag{1}$$

Among them, P is the company's stock value, b is the regression coefficient of foreign exchange risk exposure, and S is the volatility of the exchange rate.

According to the AD model, a linear relationship exists between a firm's stock return and the exchange rate change, meaning part of a firm's value variation can be attributed to exchange rate fluctuations and measured by a sensitivity coefficient—i.e., its foreign exchange risk exposure. Building on this framework, many scholars have extended the model. For instance, Jorion replaced firm value with stock return and introduced the market portfolio return as a control variable to account for the influence of macroeconomic factors on stock performance[2]. The model is formulated as:

$$R_{it} = \alpha_i + \beta_i R_{mt} + \gamma_i X_t + \varepsilon_{it} \tag{2}$$

Among them, R_{it} represents the stock return rate of the i-th company, R_{mt} is the market average return rate, X_t is β_i the rate of change of the exchange rate in period t , and reflects the sensitivity of the stock return rate of enterprise i to the market return rate. γ_i Represents the foreign exchange risk exposure coefficient of company i.

2.2. Literature review and mechanism analysis

Foreign exchange risk—also referred to as exchange rate risk or currency exposure—denotes the impact of fluctuations in exchange rates on a firm's value. Such risk may lead to either foreign exchange gains or losses. Early studies have identified three primary channels through which exchange rate movements influence firm performance: transaction risk, translation risk, and economic risk. Transaction risk stems from the uncertainty surrounding future cash flows associated with foreign currency-denominated transactions. Translation risk pertains to changes in the reported book value of assets, liabilities, and equity due to currency fluctuations. Economic risk captures the potential long-term effects of exchange rate changes on a firm's future cash flows, competitive position, and overall market share.

China's exchange rate regime has undergone several key reforms, gradually shifting from a fixed to a more market-oriented floating exchange rate system. The "8.11" reform in 2015 marked a major milestone in this transition. Prior to the reform, Ren Gu and Weiguo Zhang found that China's listed import and export firms were generally exposed to significant foreign exchange risks, with fluctuations in the CNY against developed country currencies exerting the greatest impact[5]. Yaqiong Pan, in her evaluation of the steel industry, identified substantial USD-related foreign exchange exposure, noting that CNY appreciation benefited firms[6]. Post-reform, Chun Jiang and

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Pengbo Wan empirically confirmed that all industries exhibited notable long- or short-term foreign exchange exposure, with generally high exposure levels[7]. Hongyuan Zou and Ran Luo, examining 10 industries, found that 7 faced significant exposure to CNY-USD exchange rate movements[8]. The reform has normalized two-way exchange rate fluctuations, exposing firms to heightened risks in trade, foreign debt, and overseas investment. In this context, inadequate risk management can directly undermine firms' international competitiveness, profitability, and market value. Based on this, this paper proposes:

H1 : The exchange rate fluctuation of the US dollar has a significant impact on the market value of Chinese foreign trade enterprises .

H2a: The appreciation of the US dollar against the CNY is beneficial to the stock returns of foreign trade enterprises.

H2b: The appreciation of the US dollar against the CNY reduces the stock returns of foreign trade enterprises.

3. Research design

3.1. Model settings

Referring to the AD model and Jorion model in the capital market law, this paper introduces four enterprise fundamental factors, namely, scale factor (SMB), book-to-market ratio (HML), profitability (RMW) and investment model (CMA), as exogenous control variables to construct the following benchmark model:

$$R_{it} = \alpha + \beta USD_t + \gamma_1 SMB_t + \gamma_2 HML_t + \gamma_3 RMW_t + \gamma_4 CMA_t + \varepsilon_{it} \quad (3)$$

Among them, R_{it} represents the monthly stock return rate of the ith enterprise at time t (taking into account cash dividend reinvestment), USD_t represents the monthly exchange rate change rate of the US dollar against the CNY, calculated in the form of logarithmic change rate, that is $[ln(USD_t/USD_{t-1}) \times 100\%]$. α is a constant term, β reflecting the sensitivity of the monthly return rate of individual stocks to the monthly change rate of the US dollar exchange rate, is the sensitivity coefficient $\gamma_1,\gamma_2,\gamma_3,\gamma_4$ of the monthly return rate of individual stocks to the scale factor (SMB), book-to-market ratio (HML), profitability (RMW) and investment model (CMA) , ε_{it} and is the residual term.

3.2. Description of main variables

The construction of the main variables in this paper is shown in Table 1. In terms of variable selection, this study employs a stock return metric that incorporates the reinvestment of cash dividends, offering a more accurate and holistic representation of the actual returns realized by shareholders. Furthermore, firm-level fundamentals are computed using total market capitalization-weighted averages rather than free-float market capitalization, as the former provides a more representative measure of the true market valuation. This methodology enhances the reliability of empirical results and ensures a closer alignment with real-world capital market dynamics.

DOI: 10.54254/2754-1169/2025.BL24592

Table 1: Description of main variables

Variable Types	Variable Name	Variable Description
Explained Variable	Monthly return rate of individual stocks	Monthly stock returns of sample companies taking into account cash dividend reinvestment (no unit).
Core Explanatory Variable	Monthly change of US dollar exchange rate	The logarithmic change rate of the monthly end-of-period balance of CNY per USD.
Business Fundamentals	Scale Factor (SMB)	The monthly return difference between small-cap and large-cap portfolios in the Shanghai and Shenzhen A-share markets is calculated based on the Fama 2×3 portfolio classification method. Portfolio returns are weighted by total market capitalization.
	Book-to-Market Ratio (HML)	The monthly return difference between high and low book-to-market ratio portfolios in the Shanghai and Shenzhen A-share markets is constructed using the Fama 2×3 portfolio classification method. Portfolio returns are weighted by total market capitalization.
	Profitability (RMW)	The monthly return difference between high and low profitability stock portfolios in the Shanghai and Shenzhen A-share markets is calculated using total market capitalization weighting.
	Investment Model (CMA)	The monthly return difference between low and high investment stock portfolios in the Shanghai and Shenzhen A-share markets is calculated using total market capitalization weighting.

Table 2 reports the descriptive statistics of the key variables. The average monthly stock return is 0.0087 (0.87%), with a standard deviation of 0.116, a minimum value of -0.333 (-33.3%), and a maximum of 1.018 (101.8%). The average monthly change in the USD exchange rate is 0.31%, with a standard deviation of 1.422, ranging from -3.003% to 4.158%. These statistics reveal substantial volatility in both returns and exchange rate changes, suggesting a suitable degree of variation for regression analysis. As for firm-level fundamentals, the means and standard deviations of the control variables fall within expected ranges, reflecting the systematic influence of market conditions. Overall, the sample data meet the prerequisites for subsequent empirical analysis and adequately represent the core characteristics of Chinese foreign trade-listed firms.

Table 2: Descriptive statistics of main variables

Variable Name	Number of samples	Mean	Standard Deviation	Minimum	Maximum
R	874	0.00870	0.116	-0.333	1.018
USD	874	0.310	1.422	-3.003	4.158
SMB	874	0.00491	0.0506	-0.116	0.110
HML	874	0.00668	0.0357	-0.0623	0.109
RMW	874	-0.000942	0.0169	-0.0492	0.0289
CMA	874	0.00149	0.0113	-0.0217	0.0223

3.3. Sample selection and data description

All data employed in this study are sourced from the CSMAR database. The research sample consists of 23 listed companies identified in the 2020 China Foreign Trade Top 500 Research Report. These firms occupy leading positions in China's foreign trade sector, span multiple key

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industries, and are considered highly representative. The sample period extends from January 2022 to February 2025, capturing the accelerated phase of Chinese enterprises' overseas expansion following the COVID-19 pandemic. This time also coincides with a critical period of global monetary policy shifts and heightened exchange rate volatility, thereby lending the study substantial practical relevance and policy implications.

This paper uses Stata17 software for data analysis and model estimation.

4. Empirical results and analysis

4.1. Benchmark regression results

Table 3 reports the regression results of the baseline model. The core explanatory variable, USD, consistently exhibits a significantly negative coefficient across all specifications, ranging from –0.011 to –0.015, and is statistically significant at the 1% level. This finding indicates that Chinese foreign trade firms are significantly exposed to U.S. dollar fluctuations, and an appreciation of the U.S. dollar (or a depreciation of the CNY) negatively affects their market performance, thereby supporting H1 and H2b. Specifically, columns (1) and (2) include firm fixed effects. Without controlling for time effects, the results suggest that yuan appreciation significantly improves stock returns. Columns (3) to (5) further introduce RMW and CMA from the Fama–French five-factor model as additional controls. The coefficient on USD remains significantly negative and slightly increases in magnitude, implying that its effect on stock returns is not driven by firm characteristics captured by style factors, thereby confirming the robustness of the results. Among the control variables, SMB is significantly negative in some specifications, indicating a possible size effect. HML is consistently negative and highly significant, suggesting that value stocks underperform growth stocks within the sample. Both RMW (profitability) and CMA (investment model) are positive and strongly significant, indicating that firms with stronger profitability and more conservative investment behavior tend to earn higher returns. Regarding economic significance, the coefficients in columns (3) through (5) imply that a 1% appreciation of the U.S. dollar relative to the CNY corresponds to an average monthly stock return decline of approximately 1.5% for the sample firms.

These results suggest that, despite the extensive cross-border operations of large foreign trade enterprises, their average exposure to exchange rate risk remains relatively limited. This phenomenon is commonly referred to as the "Exchange Rate Exposure Puzzle." Existing literature has offered several explanations for this counterintuitive outcome. In Jorion's early work, he argued that the effect of exchange rate fluctuations on firm value may be offset by other factors, resulting in a negligible or even zero net impact[2]; Building upon this foundation, Bodnar and Gentry conducted a more comprehensive investigation and concluded that corporate hedging practices significantly reduce the sensitivity of firm profitability to exchange rate movements[9]. Therefore, the "Exchange Rate Exposure Puzzle" is not a methodological artifact or a theoretical flaw, but rather a reflection of firms' financial strategies and risk management practices at the microeconomic level[10].

As for the negative direction of the coefficient of the core variable , this paper believes that there are the following possible reasonable explanations: First, import cost pressure. Foreign trade enterprises are more dependent on imported raw materials and intermediate products denominated in US dollars. The depreciation of the CNY leads to rising costs and compressed profit margins. The market therefore lowers its profit expectations, thereby depressing stock prices. Second, the burden of foreign debt has increased. According to the data on China's foreign debt at the end of 2024

DOI: 10.54254/2754-1169/2025.BL24592

released by the State Administration of Foreign Exchange of China, the balance of foreign debt in other sectors (including loans between related companies) is US$882.3 billion, accounting for 36%; the balance of foreign currency foreign debt is US$1207.6 billion, of which US dollar debt is as high as 80%. Therefore, the depreciation of the CNY will increase the debt repayment costs of foreign trade enterprises, push up corporate financial risks, and trigger investors to sell stocks. Third, the transmission of economic expectations and market sentiment. In the short term, the transmission mechanism of economic expectations and market sentiment is often more dominant than fundamental factors, that is, the collective expectations of market participants will directly affect asset pricing, and even deviate from the actual operating conditions of enterprises. First, the depreciation of the CNY has caused international investors of foreign trade companies with a high proportion of foreign shareholdings to reduce their holdings of CNY assets in order to avoid exchange rate losses, thereby directly depressing stock prices; secondly, during the Fed's interest rate hike cycle from 2022 to 2023, the strengthening of the US dollar has triggered continuous capital outflows and market sentiment has deteriorated, forming a negative feedback loop of " depreciation - foreign capital outflow - stock price decline" ; in addition, due to the existence of "herd effect" and "investor cognitive bias" in the capital market, the uncertainty brought about by the fluctuation of the US dollar will amplify investors' fear of losses, leading to irrational selling of a large number of stocks and exacerbating short-term stock price declines.

Table 3: Benchmark regression results

variable	stock_ret				
	(1)	(2)	(3)	(4)	(5)
USD	- 0.011***	- 0.0109***	-0.015***	-0.01 47 ***	-0.0147***
	(0.003)	(-3.99)	(0.003)	(-5.43)	(-5.47)
SMB	-0.150*	-0.150	-0.321***	- 0.321***	-0.321***
	(0.089)	(-1.69)	(0.104)	(-3.09)	(-3.11)
HML	-0.738***	-0.738***	-0.886***	-0.886***	-0.886***
	(0.128)	(-5.75)	(0.127)	(-7.00)	(-7.0 5)
RMW			1.200***	1.200***	1.200***
			(0.315)	(3.81)	(3.8 3)
CMA			3.193***	3.193***	3.193***
			(0.453)	(7.05)	(7.10)
_cons	0.018***	0.01 77 ***	0.017***	0.017 2 ***	0.017 2 ***
	(0.004)	(4.40)	(0.004)	(4.37)	(4.40)
FE	Yes	Yes	Yes	Yes	No
Time FE	No	No	No	No	No
Sample size	874	874	874	874	874

Note: The table reports regression coefficients, with standard errors in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively. FE refers to individual fixed effects and Time FE refers to time fixed effects. The notation applies to all subsequent tables.

4.2. Endogeneity test

In this study, the fluctuation of the US dollar exchange rate may be affected by variables such as the Federal Reserve's monetary policy shock and changes in the US dollar index, which may also affect corporate stock prices, resulting in the correlation between USD and the error term, making the estimation results have endogenous risk. In order to solve this problem, this paper introduces the

DOI: 10.54254/2754-1169/2025.BL24592

monthly logarithmic change rate of the Federal Reserve's federal funds rate (Fed_rate_t) as an instrumental variable and uses the two-stage least squares (2SLS) method to estimate the endogenous test of model (3). The 2SLS approach effectively controls for error term correlation caused by unobserved heterogeneity, thereby mitigating endogeneity bias. Its main principles are as follows:

$$\widehat{USD}_t = \alpha_i + \beta_i Fed\_rate_t + \gamma_i X_t + \varepsilon_{it} \quad (4)$$

$$R_{it} = \theta_t \widehat{USD}_t + \delta_i X_t + \varepsilon_{it} \quad (5)$$

Among them, $\widehat{USD_t}$ is USD_t the predicted value of , and X_t is the control variable composed of four enterprise fundamental factors.

The analysis and conclusions obtained Fed_rate_t from the Stata output results are as follows: According to the regression results of the first stage, model (4), the coefficient is 0.566902, and the t value and F statistic are extremely large, indicating that Fed_rate_t it is a strong instrumental variable. In the Durbin-Wu-Hausman test, since USD_t the coefficients in the OLS and 2SLS estimation results are not significant (OLS: P = 0.854 ; 2SLS: P = 0.881) and the coefficient difference is small (OLS: -0.000551; 2SLS: -0.0026934), the null hypothesis P_0 that "USD is an exogenous variable" cannot be rejected.

4.3. Robustness test

To verify the robustness of the benchmark regression results, this paper conducts the following tests: First, replace the core explanatory variable, and use the logarithmic change rate of the monthly average of one dollar in CNY (avg_USD) to replace the logarithmic change rate of the monthly end-of-period number. Second, replace the core explained variable, and use the monthly excess return of individual stocks (excess_ret) to replace the monthly return rate of individual stocks. Third, replace the core explanatory variable and the explained variable at the same time. The robustness test results are shown in Table 4.

DOI: 10.54254/2754-1169/2025.BL24592

Table 4: Robustness test results

variable	stock_ret	excess_ret	excess_ret	excess_ret
	(1)	(2)	(3)	(4)
USD		-1.087***	-1.472***	
		(0.273)	(0.271)	
avg_USD	-0.008**			-0.831**
	(0.003)			(0.337)
SMB	-0.302***	-15.050*	-32.086***	-30.174***
	(0.106)	(8.926)	(10.382)	(10.633)
HML	-0.950***	-73.869***	-88.597***	-95.041***
	(0.128)	(12.829)	(12.657)	(12.763)
RMW	1.042***		119.851***	104.065***
	(0.318)		(31.524)	(31.847)
CMA	2.986***		318.976***	298.294***
	(0.464)		(45.276)	(46.442)
_cons	0.016***	1.649***	1.590***	1.441***
	(0.004)	(0.404)	(0.393)	(0.401)
FE	Yes	Yes	Yes	Yes
Time FE	No	No	No	No
Sample size	874	874	874	874

The robustness test results show that after using the new variable combination, the coefficient estimates of the average rate of change of the US dollar exchange rate are significantly negative at the 1 % and 5 % levels. This result is consistent with the baseline regression, indicating that the appreciation of the US dollar has a stable negative impact on the market value of enterprises. Secondly, the direction and significance of the coefficients of the control variables are basically consistent with the baseline regression , indicating that the research conclusions are not affected by the model setting and variable selection . Therefore, the robustness test results once again verify Hypothesis 1 and Hypothesis 2b .

5. Conclusion and implications

Based on the foreign exchange risk exposure theory, combined with the capital market approach and the Fama-French five-factor model, this paper systematically examines the impact of changes in the US dollar exchange rate on corporate market value using monthly data from 23 of China's top 100 foreign trade listed companies from January 2022 to February 2025. The empirical results show that: First, after controlling for corporate fundamentals, companies face significant US dollar risk exposure , especially in the context of CNY depreciation, where fluctuations in the US dollar exchange rate have a significant negative impact on the monthly returns of individual stocks . Second, by replacing both the core explanatory variables and the explained variables , the negative effect of changes in the US dollar exchange rate on corporate value remains robust.

The exchange rate risk exposure analysis framework constructed in this paper has strong practical significance and methodological value in the study of foreign trade enterprises: First, the "exchange rate sensitivity regression + fundamental control" framework is adopted to link the US dollar exchange rate changes with individual stock returns , providing a new perspective for measuring the actual market consequences of foreign exchange risks. Secondly, the transmission path of the negative impact of the rise in the US dollar exchange rate on the returns of individual stocks is

DOI: 10.54254/2754-1169/2025.BL24592

specifically explained from the three perspectives of transaction risk, conversion risk and market expectations . In addition, this research method can also be extended to enterprises along the "Belt and Road", offshore CNY market participants and cross-border financial technology platforms, to analyze their exchange rate risk exposure and risk exposure response capabilities under a multi-currency transaction structure .

This paper systematically explores how USD exchange rate fluctuations affect Chinese foreign trade firms but has some limitations. First, the sample is limited to top-listed companies. Future research should include a larger, more diverse set of firms, including non-listed ones, to improve generalizability. Second, key firm-level factors like export dependence, foreign currency debt, and hedging activities are not captured. Developing a more detailed foreign exchange exposure index would enhance model accuracy.Methodologically, future studies could apply nonlinear machine learning models to better capture complex relationships between exchange rates and corporate performance. With further theoretical and technological advances, research can deepen understanding of firms' foreign exchange risk management, ultimately supporting the development of a robust, dynamic risk framework. This would provide empirical guidance and policy recommendations for firms to adopt proactive, structured hedging strategies that promote stable operations and sustainable value growth amid exchange rate volatility.

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