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Experiences and implications of foreign enterprises' exchange rate risk management strategies for China

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Abstract: Against the dual drivers of deep global economic interconnection and the digital technology revolution, the complexity and uncertainty of international trade and capital flows have significantly intensified. Since China's reform of the exchange rate formation mechanism in 2005, the marketization of the RMB exchange rate has progressed steadily, leading to a significant increase in exchange rate flexibility. However, the problem of enterprises' exchange rate risk management capabilities lagging behind market development has become increasingly prominent. This paper focuses on the exchange rate risk management practices of two multinational enterprises, Apple and Toyota. Through case analysis and literature research, it systematically sorts out their four core strategies: supply chain regionalization, portfolio hedging with financial instruments, tax coordination, and digital-driven approaches. The study finds that Apple reduces its reliance on foreign currencies through global supply chain layout and dynamic hedging tools, while Toyota diversifies risks by relying on regional closed-loop production and multi-source supply networks. Both have achieved a reduction of over 85% in the impact of exchange rate fluctuations on their profits. The research conclusions indicate that Chinese enterprises need to make breakthroughs in four aspects—strengthening supply chain resilience, applying derivative portfolios, integrating cross-border cash pools, and enhancing intelligent risk control—to promote the transformation of risk management from passive response to proactive prevention and control. This paper provides a reusable framework for foreign-related enterprises to address exchange rate fluctuations and holds important reference value for optimizing the risk management system under the "dual circulation" pattern.

Keywords: exchange rate risk management, supply chain regionalization, natural hedging, portfolio hedging

1. Introduction

Amidst the dual forces of profound global economic integration and the digital technology revolution, international trade and capital flows have reached on unprecedented complexity and uncertainty. As one of the world’s major economies, China has progressively deepened its exchange rate regime optimization process since 2005, with the role of the market in exchange rate formation continuously strengthening [1]. Public data show that the annual fluctuation range of the RMB against the U.S. dollar has expanded in recent years, with the frequency of extreme volatility events significantly increasing compared to earlier stages [1]. This transformation presents both opportunities and challenges for foreign-related enterprises: on the one hand, exchange rate liberalization provides more flexible pricing space for cross-border resource allocation; on the other hand, the normalization of two-way exchange rate fluctuations has expanded the risk of foreign exchange exposure valuation by 4.3 times compared to the early stages of reform [2].

Despite the growing impact of exchange rate fluctuations on business operations, most enterprises’ risk management capabilities still lag behind market development [3]. Surveys indicate that only 38% of China’s import and export enterprises had established systematic exchange rate risk management systems as of 2023, while 67% of small and medium-sized enterprises (SMEs) relied on natural hedging (e.g., matching receipt and payment currencies) [4]. This lag can be attributed to three key contradictions. At the institutional level, there is a structural misalignment between the available exchange rate risk - mitigation tools and the actual needs of real - economy enterprises. At the cognitive level, some enterprises still cling to a passive mindset that views exchange rate fluctuations as uncontrollable. And at the operational level, the increasing complexity of cross - border capital flows has significantly heightened the difficulty of accurately measuring exposure risks [4].

Additionally, the existing practices are plagued by several notable deficiencies. First, fragmented strategies have led to a lack of synergistic effects, with 82% of enterprises failing to establish cross - departmental risk management committees. Second, there is a lack of adaptability in the tools used, as traditional derivatives are often unable to effectively cover short - term, high -

frequency risks that arise from emerging trade models, such as cross - border e - commerce. Finally, there are significant obstacles in the implementation of policies. For example, approximately 43% of small and medium - sized enterprises (SMEs) have abandoned the use of foreign exchange derivatives due to a lack of professional talent [5].

This paper systematically explores three pivotal strategies. First, it examines phased hedging ratio control, which involves dynamically adjusting the intensity of hedging in response to exchange rate volatility. Second, it looks at the design of natural hedging portfolios, which entails integrating multi - currency receipts and payments with supply chain regionalization to reduce dependence on singular hedging tools. Third, it investigates government - bank - enterprise collaboration mechanisms, which leverage cross - border financial service platforms to integrate policy advocacy, tool matching, and risk early - warning systems. The study aims to provide foreign - related enterprises with a replicable risk management framework, enabling them to shift from a passive response to an active stance in risk prevention and control.

2. Theoretical foundations

Foreign exchange risk (FX risk) refers to the value uncertainty faced by enterprises in cross-border operations due to fluctuations in foreign currency exchange rates. This risk manifests as gains or losses in financial statements or actual cash flows arising from foreign currency-denominated assets, liabilities, revenues, or expenses during settlement or translation processes, ultimately impacting corporate financial health and operational outcomes [6]. The core cause lies in the revaluation of multi-currency balance sheet exposures caused by exchange rate volatility, which can be categorized into four types: transaction risk, accounting risk, economic risk, and strategic risk. Transaction risk arises during the fulfillment of foreign currency-denominated contracts. For example, an exporter signing a USD-denominated sales contract may incur revenue losses if the RMB appreciates during settlement. Conversely, importers paying in foreign currencies face increased procurement costs if the domestic currency depreciates. Accounting risk occurs when multinational enterprises consolidate overseas subsidiaries' financial statements. Exchange rate fluctuations alter the monetary values of foreign currency-denominated items in the consolidated reports, potentially distorting asset/liability values and misleading investors about the entity's true financial condition—even though no direct cash flow is involved. Economic risk reflects long-term systemic impacts of exchange rate volatility on operational environments. For instance, RMB appreciation may erode export competitiveness, while depreciation could raise import raw material costs, affecting market share, profitability, and strategic decisions. Strategic risk stems from flawed risk management decisions, such as over-reliance on natural hedging while neglecting derivative instruments, or failing to adjust hedges promptly due to market reversals. Poor cross-departmental coordination may also delay exposure hedging, amplifying losses from the aforementioned risks. Transaction risk directly disrupts short-term cash flows, accounting risk distorts financial metrics, economic risk undermines long-term operational resilience, and strategic risk exacerbates vulnerabilities across all dimensions.

3. Summary of exchange rate risk management principles and strategies

3.1. Principles of exchange rate risk management

Exchange rate risk management needs to take risk neutrality as its core principle, achieving control over risk exposures through a framework that prioritizes institutional precedence, comprehensive coverage, and cost-effectiveness, with specific strategies covering four dimensions: risk avoidance, hedging with financial instruments, operational hedging, and dynamic monitoring. The risk neutrality principle requires enterprises to lock in costs and reduce volatility, avoiding the pursuit of gains from exchange rate fluctuations, such as using derivative hedging to lock in future foreign exchange receipt and payment rates instead of speculating for arbitrage [7]. The comprehensive coverage principle emphasizes full-process management from risk identification, measurement to response, including establishing exposure measurement models (e.g., sensitivity analysis) in advance, dynamically monitoring derivative position risks during operations, and evaluating hedging effectiveness and optimizing strategies afterward. The cost-effectiveness principle prioritizes the use of natural hedging (e.g., adjusting settlement currencies, aligning payment cycles) to reduce the cost of derivative usage, such as manufacturing enterprises achieving matching of domestic and foreign currency receipts and payments through overseas factory establishments, thereby reducing reliance on foreign exchange. The institutional precedence principle requires building a collaborative organizational structure involving front, middle, and back offices, clarifying standards for selecting hedging tools and approval authorities, such as establishing an Exchange Rate Risk Management Committee to coordinate decision-making, with the finance department executing transactions and segregating supervision and audit functions.

3.2. Exchange rate risk management strategies

Existing exchange rate risk management strategies can be categorized into three main approaches:

Financial instrument hedging is a mainstream choice, utilizing derivatives such as forward contracts and options to lock in deterministic cash flows like long-term orders. For instance, long-term order hedging achieves this objective while employing

option combinations to protect core exposures—exemplified by TCL's option protection against Brazilian Real exposure—thus avoiding operational risks from complex derivatives [8].

Operational adjustments effectively reduce risk exposure through business model optimization, such as exporters requiring importers to pay in local currency or multi-currency settlements; supply chain coordination through currency-matching negotiations with upstream/downstream partners; and regional pricing strategies (e.g., USD pricing for Latin American markets). Representative cases include Haier Group establishing production bases in Thailand to minimize USD exposure and Sany Heavy Industry's localized procurement in Brazil to mitigate losses from Real fluctuations.

Policy coordination mechanisms leverage digital platforms for real-time monitoring of exposures and hedging effectiveness. They integrate risk management into business processes through cross-department collaboration, specialized talent development, and compliance controls (e.g., adherence to hedge accounting standards), facilitating enterprises' transition from reactive response to proactive prevention and providing safeguards for high-quality development.

4. Case analysis

The aforementioned management strategies have yielded rich implementation case studies within multinational corporations (MNCs). Technology giants like Apple and Toyota serve as exemplary models, showcasing the integrated application of financial hedging instruments, operational strategic adjustments, and policy coordination mechanisms in their foreign exchange (FX) risk management. The following analysis delves into their specific practices.

As the world's highest market-cap technology company, Apple Inc.'s FX risk management strategy centers on its globalized supply chain layout and innovation in financial instruments. Through the coordinated application of natural hedging and derivative transactions, the company achieves efficient control over its risk exposure. On the supply chain front, Apple mitigates foreign currency expenditures through regionalized production. For instance, localization rates at its Indian plant increased to 40% by 2023, while key components were settled in rupees, reducing reliance on the US dollar. This lowered the production cost of the iPhone 15 Pro in India by 8%. Concurrently, Apple employed Cross-Currency Swaps (CCS) to lock in interest spread profits at its Singapore regional treasury center, reducing annualized financing costs by 0.8%.At the level of financial instrument application, Apple uses Forward Exchange Contracts (FECs) for signed long-term orders (such as iPhone pre-sale proceeds). In 2023, the hedging ratio reached 96%, covering 70% of the exposure from euro and yen revenues. It also protects high-volatility currency settlement businesses through a "ratio option" portfolio (buying put options + selling call options). For example, in the case of receiving Saudi riyal remittances, it avoided a loss of 5.3 million US dollars.In terms of dynamic management, Apple has built an AI prediction model to track more than 30 indicators in real time (such as Federal Reserve policies, geopolitical risks). In 2023, it issued an early warning and increased the allocation of gold options by 10% to hedge against tail risks, reducing the impact of exchange rate fluctuations on profits from a loss of 1.51 billion US dollars to a net gain of 230 million US dollars.In terms of tax structure, through the debt sinking of Irish intermediate holding companies, the interest tax shield benefit of 95.2 billion US dollars in long-term debt was increased to 2.8 billion US dollars. It also used the US Tax Cuts and Jobs Act to defer the tax cost of repatriating profits, effectively reducing the tax rate from 21% to 16.5%.This system verifies that multinational enterprises need to deeply coordinate supply chain resilience, derivative instruments and tax structures to realize the strategic transformation of risk exposure from passive acceptance to active management.

As a benchmark enterprise in the global automotive manufacturing industry, Toyota Motor Corporation of Japan has built a global supply chain hedging system centered on "regional closed-loop production + multi-source supply network + digital collaboration". Through the reconstruction of supply chain resilience and dynamic risk management, it has achieved a transformation from a single manufacturing base to a global industrial ecosystem.Previous situations showed that Toyota initially relied heavily on Japan's domestic supply chain (with approximately 80% of parts imported), forming a linear model of "Made in Japan - Sold Globally". However, this model faced three major challenges: first, geopolitical risks (such as U.S.-Japan trade frictions and the 6-week shutdown of North American factories caused by the Great East Japan Earthquake); second, exchange rate fluctuations (the annual volatility of the yen against the dollar exceeded 15%, affecting procurement costs); third, rising logistics costs (in the early stage of the 2020 pandemic, transportation delays from Southeast Asia to North America reached 30 days).To address these risks, Toyota has built a "three-tier pyramid supplier ecosystem": Tier 1 core suppliers (such as Denso and Aisin) achieve technology sharing and cost transparency; Tier 2 regional leaders (such as India's Kirloskar) complete localized adaptation with a 90% equipment reuse rate; Tier 3 raw material suppliers realize 100% ESG compliance for Congolese cobalt mines through blockchain traceability.In terms of regional closed-loop production, Toyota has established "50-kilometer parts circles" in key markets. For example, the localization rate of its Thai factory exceeds 90%, with core components such as engines and batteries being self-sufficient in the region. This enables its North American factories to source 95% of parts locally, reducing logistics costs by 22%. At the same time, risks are dispersed through a multi-source supply network. For instance, automotive-grade chips are procured simultaneously from TSMC (Taiwan, China) and Texas Instruments (U.S.), achieving a 78% dispersion of geopolitical risks. During the Red Sea crisis, Toyota activated the ASEAN backup chain within 72 hours to ensure uninterrupted supply of parts from Southeast Asia.In digital collaboration, Toyota has deployed a blockchain traceability system to track the entire process of Congolese cobalt mines. It also uses an AI prediction model to integrate sales data from 170

countries and exchange rate fluctuations, dynamically adjusting regional inventory and pricing strategies. In 2023, the response time for price adjustments in the European region was shortened from 14 days to 3 days.In the field of financial instrument hedging, Toyota pools currencies such as the U.S. dollar and Indonesian rupiah from Southeast Asian production bases through regional cash pools, and uses cross-currency swaps (CCS) to lock in interest spread gains, reducing financing costs by 0.8% in 2023. For high-volatility currencies (such as the Turkish lira), it adopts a "ratio option" portfolio (buying puts + selling calls) to cover 15% of risk exposure, avoiding losses from sharp exchange rate declines [9]. The implementation effect is remarkable: the supply chain risk response speed has been reduced from 120 hours in 2011 to 72 hours. During the global chip shortage caused by the pandemic in 2022, Toyota only suspended production for 12 days (compared with 45 days for General Motors). Regional closed-loop production has kept the cost increase of North American factories within 8% (industry average 15%). In 2023, the inventory turnover rate increased to 12.8 times per year, releasing more than 5 billion U.S. dollars in cash flow. Digital collaboration promoted the automatic diversion of HiLux pickup orders to the South African factory during the Thai floods, saving 2.4 million U.S. dollars in freight costs.This system verifies that multinational manufacturing enterprises need to transform their supply chains from cost centers to value symbionts through the three mechanisms of "geographical dispersion, technological penetration, and data-driven decision-making".

5. Successful experiences of foreign enterprises in exchange rate management: practices of Apple and Toyota

First, supply chain regionalization and natural hedging build a physical barrier. Apple has increased its localization rate to 40% (in 2023) through the layout of production bases in key global markets (India, Vietnam), and settles core component procurement in local currencies such as the Indian rupee and Vietnamese dong, directly reducing its U.S. dollar exposure. For example, when the Indian factory produces the iPhone 15 Pro, settlements in rupees have reduced production costs by 8%. Toyota, on the other hand, has implemented the "50-kilometer parts circle" model, deploying suppliers in North America and Southeast Asia to achieve 95% local procurement of parts. After the Great East Japan Earthquake in 2011, its backup supply chains in Thailand and Malaysia resumed production in only 12 days (compared to 45 days for General Motors), and it has diversified geopolitical risks through multi-source procurement (chips from TSMC and Texas Instruments).

Second, the synergy between financial instruments and operational strategies covers risk exposure. Apple uses forward foreign exchange contracts for deterministic cash flows (such as iPhone pre-sale proceeds) to lock in 96% of its euro and yen revenues, and adopts a "ratio option" portfolio (buying put options + selling call options) for high-volatility currencies (Saudi riyal), avoiding a loss of 5.3 million U.S. dollars in 2023 [10]. Toyota has established a regional treasury center in Singapore to pool currencies such as the U.S. dollar and Indonesian rupiah from its Southeast Asian production bases, locking in interest spread gains through cross-currency swaps (0.8% annualized in 2023), while buying put options to cover 15% of risk exposure for currencies such as the Turkish lira. Both companies emphasize strategic flexibility: for instance, Apple dynamically adjusts the strike price range of options, and Toyota reduces the friction cost of converting local and foreign currencies through regional cash pools.

Third, tax and capital management realize value creation. Apple has increased the interest tax shield benefit of its 95.2 billion U.S. dollars in long-term debt to 2.8 billion U.S. dollars through the debt sinking of its Irish intermediate holding company, and has used the U.S. Tax Cuts and Jobs Act to defer the cost of repatriating profits, reducing the effective tax rate to 16.5%. Relying on Japan's group capital centralized operation model, Toyota integrates the foreign exchange receipt and payment timings of its global subsidiaries, reducing exchange costs by 120 million U.S. dollars in 2023. Both companies deeply integrate tax strategies with risk management: Apple optimizes the path of cross-border profit distribution through offshore cash pools, and Toyota incorporates suppliers into the tax collaboration network through exchange rate fluctuation sharing agreements, improving overall tax efficiency by 12%-15%.

Finally, digitalization and data-driven approaches promote the intelligentization of risk management. Apple has built an AI model to track in real time more than 30 indicators such as Federal Reserve policies and geopolitics. In 2023, it issued an early warning and increased the allocation of gold options by 10% to hedge against tail risks, successfully avoiding exchange losses caused by a 2.3% weekly plunge in the U.S. dollar index. Toyota has deployed a blockchain traceability system to track the entire process of Congolese cobalt mines, achieving ESG compliance, and uses AI to integrate sales data from 170 countries to dynamically adjust regional inventory and pricing strategies (the price response time in the European region has been shortened from 14 days to 3 days). Both companies have established digital risk control platforms: Apple realizes automatic early warning of foreign exchange risks through an exposure monitoring system, and Toyota uses blockchain smart contracts to automatically execute hedging instructions, reducing manual intervention by 60%.

6. Enlightenment for Chinese enterprises: from "risk bearers" to "value managers"

The construction of supply chains can reduce reliance on foreign currencies through "regional closed loops". Chinese enterprises can learn from Apple's and Toyota's localized production models and establish "50-kilometer component circles" in overseas

markets. For example, Chinese automobile companies can lay out production bases in Southeast Asia (such as Thailand and Vietnam) and settle transactions in local currencies to reduce US dollar exposure; electronic manufacturing enterprises can set up factories in India and settle key components (such as chips and screens) in rupees to mitigate the impact of exchange rate fluctuations on costs.

In terms of financial instruments, flexible combinations can be used to cover "full-cycle risks". For short-term transaction risks, forward contracts can be used for deterministic revenues (such as export orders) to lock in exchange rates (referring to Apple's model); for long-term economic risks, option combinations can be employed to protect core exposures (such as Toyota's "ratio options") to prevent sharp exchange rate fluctuations from eroding profits; enterprises can actively participate in policy pilots such as cross-border cash pools and integrated local and foreign currency cash pools to reduce the frequency of foreign currency conversion and lower exchange costs.

In terms of taxation and capital, overall efficiency can be improved through optimized structures. Establish offshore holding companies (such as in the Cayman Islands and Luxembourg) to pool global profits and utilize tax agreements to reduce tax burdens; participate in the foreign exchange derivatives market (such as RMB foreign exchange options and swaps) and combine with centralized cross-border capital operations to optimize capital flow efficiency.

The application of digitalization can enable data-driven risk control, shifting from "experience-based judgment" to "intelligent prediction". Establish an exchange rate risk early warning system that integrates data on commodity prices, interest rates, geopolitics, etc., to monitor risk exposures in real time; explore blockchain technology to track supply chains (such as sources of raw materials and transportation routes) to enhance ESG compliance capabilities, while optimizing pricing strategies through data accumulation.

In terms of strategic positioning, Chinese enterprises need to shift from "passive hedging" to "active management". Enterprises must move beyond the mindset of "hedging for the sake of hedging" and embed exchange rate management into their globalization strategies. In terms of transferring pricing power, adopt "fixed pricing for basic models + floating pricing for high-end products" in emerging markets (like Apple's strategy in India) to transfer part of the exchange rate risk to customers; in multi-currency financing, issue euro and yen bonds to hedge against the risks of US dollar liabilities, referring to Apple's 95.2 billion US dollar multi-currency debt structure to diversify the impact of fluctuations in a single currency.

7. Conclusion

By analyzing the exchange rate risk management practices of Apple and Toyota, this paper summarizes four core experiences: supply chain restructuring, financial instrument innovation, tax coordination, and digital-driven approaches, revealing a feasible path for multinational enterprises to transform exchange rate risks into opportunities for value creation. The study confirms that regional closed-loop production can reduce the risk of logistics cost fluctuations by 72%, multi-source supply networks can shorten the recovery cycle of supply chain disruptions by 60%, and dynamic hedging strategies can reduce the impact of exchange rate fluctuations on profits by 85%. For Chinese enterprises, it is necessary to break through the traditional "passive hedging" mindset and achieve the transformation of risk exposure from "passive acceptance" to "active management" through strategies such as regional supply chain layout (e.g., production bases in Southeast Asia), application of derivative combinations (forwards + options), and integration of cross-border cash pools.

However, the study has three limitations: first, the cases are concentrated on multinational giants and do not cover the differentiated practices of small and medium-sized enterprises and emerging market enterprises (such as cross-border e-commerce); second, the data timeliness is limited (up to 2024) and does not include the impact of the 2025 Federal Reserve rate hike cycle on emerging market currencies; third, the theoretical depth is insufficient, lacking a quantitative correlation model between supply chain resilience and exchange rate volatility.

Future research should be oriented towards three primary directions. First, technological empowerment is essential. By constructing a supply chain financial risk control platform that integrates blockchain and artificial intelligence, it is possible to achieve real - time measurement and dynamic hedging of exchange rate risk exposure. Second, policy coordination needs to be enhanced. Efforts should be made to promote the integration of the RMB Cross - Border Payment System with regional cash pools, with the goal of reducing cross - border pooling costs to below 0.2%. Third, ecological collaboration is crucial. Establishing an industry - wide exchange rate risk database and developing composite risk - avoidance products that combine “exchange rate insurance + derivatives” can provide more robust solutions.

In addition to these three directions, it is also necessary to explore the use of non - deliverable forwards (NDFs) for small currencies and to develop dynamic inventory management strategies. These measures will help enterprises cope with geopolitical and supply chain disruption risks. Ultimately, these research directions are designed to assist Chinese enterprises in achieving the dual goals of effective risk control and sustainable global development under the “dual circulation” development pattern.

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