Research on Risk Identification and Control in International Financial Services Supply Chains

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Abstract: With the continuous advancement of economic globalization, the position of international financial service supply chains in the global economy has become increasingly important. This paper focuses on risk identification and control in international financial service supply chains, elaborating in detail on various risk types including credit risk, market risk, and operational risk. Through in-depth analysis of the causes and mechanisms of these risks, a series of targeted risk control strategies are proposed, including building comprehensive credit evaluation systems, strengthening market risk monitoring and early warning, optimizing operational processes and strengthening internal controls. The aim is to enhance the stability and risk resistance capability of international financial service supply chains and promote their healthy and sustainable development.

***Keywords*:** international financial service supply chain; risk identification; risk control

1. Introduction

Under the wave of economic globalization and financial integration, international financial service supply chains serve as key links connecting global financial resources with the real economy, and their efficient and stable operation is crucial for global economic development. International financial service supply chains integrate numerous entities including financial institutions, logistics enterprises, and import-export companies, ensuring smooth international trade and cross-border production by providing a series of financial services such as capital financing, payment settlement, and risk management. However, as they involve multiple countries and regions and face complex and changing political, economic, and legal environments, international financial service supply chains contain various risks. Once risks are uncontrolled, they will severely impact the global economic order. Therefore, in-depth research on risk identification and control in international financial service supply chains has important practical significance.

2. Overview of International Financial Service Supply Chains

2.1 Concept and Composition

International financial service supply chains refer to functional network chain structures in international economic activities that center around core enterprises and effectively integrate and control information flow, logistics flow, and capital flow. Various entities including financial institutions, logistics enterprises, suppliers, manufacturers, and distributors participate together to provide financial service support for the entire process from production to consumption of products or services. Among these, financial institutions include commercial banks, investment banks, and insurance companies, mainly providing financial services such as financing, settlement, and insurance; logistics enterprises are responsible for goods transportation, warehousing, distribution and other logistics links, playing a connecting and supporting role in the supply chain; import-export enterprises, as the core of the supply chain, have their operating conditions and credit levels critically affecting the stable operation of the entire supply chain.

2.2 Operating Models

International financial service supply chains have diverse operating models, with common ones including accounts receivable-based financing models, inventory pledge financing models, and prepayment financing models. Taking the accounts receivable financing model as an example, in international trade, export enterprises transfer their accounts receivable from import enterprises to financial institutions. After verifying the authenticity and validity of the accounts receivable, financial institutions provide a certain percentage of financing to export enterprises. When import enterprises pay for goods on schedule, financial institutions recover the financing principal and interest from the payment. This model helps export enterprises accelerate capital recovery and relieve financial pressure, while also expanding business areas for financial institutions[1].

3. Risk Identification in International Financial Service Supply Chains

3.1 Credit Risk

Credit risk dominates in international financial service supply chains, rooted in credit deficiencies or default behaviors of various supply chain participants. Small and medium-sized enterprises (SMEs) generally have low credit ratings due to their own scale limitations, unsound financial systems, and low information transparency. During the financing process, these enterprises often face repayment difficulties or even default due to weak risk resistance and susceptibility to market fluctuations. According to relevant data, in international supply chain financing business, the default rate of SMEs is about 15%-20% higher than that of large enterprises, seriously affecting the stability of supply chain finance.

Some core enterprises may also experience credit deterioration due to poor management or drastic market environment changes. For example, certain industry leaders may break their capital chains due to blind expansion, unable to fulfill credit support commitments to upstream and downstream enterprises, or delay payment for goods. Such behavior not only destroys the trust foundation of the supply chain but may also trigger chain reactions, leading to credit crises throughout the entire supply chain.

Additionally, international financial service supply chains span multiple countries and regions, with significant differences in credit systems and legal frameworks across countries. For example, credit systems in Europe and America are dominated by market-based credit agencies, while some Asian countries rely on government-led credit evaluation mechanisms. These differences make credit risk assessment lack unified standards, increasing the difficulty and complexity of credit risk management.

3.2 Market Risk

International financial service supply chains face complex and volatile market risks, mainly covering exchange rate risk, interest rate risk, and commodity price risk. In international trade, exchange rate fluctuations are key factors affecting enterprise costs and revenues[2]. For example, in 2022, the sharp decline of the euro against the US dollar caused European export enterprises' US dollar-denominated income to shrink significantly when converted to euros, with some enterprises' profits declining by more than 30%. Conversely, when the domestic currency depreciates, import enterprises' procurement costs will increase significantly, compressing profit margins.

Interest rate risk mainly stems from the uncertainty of market interest rate fluctuations. When financial institutions provide financing services, their funding costs and returns are closely related to market interest rates. When market interest rates rise, financial institutions' financing costs increase, but due to lag in loan contract rate adjustments, they often cannot promptly pass cost pressure to borrowers, resulting in narrowed interest spreads and reduced profitability. According to statistics, for every 1 percentage point increase in interest rates, financial institutions' supply chain finance business profit margins may decrease by 0.5-0.8 percentage points.

Commodity price risk is influenced by multiple factors including market supply and demand, macroeconomic conditions, and natural disasters. For example, international crude oil prices plummeted in 2020 due to the pandemic-induced demand collapse, causing inventory values of enterprises in the petrochemical industry chain to shrink significantly, with production and operating costs becoming difficult to control, and some enterprises facing enormous financial pressure.

3.3 Operational Risk

Operational risk runs through all links of international financial service supply chains, mainly caused by imperfect internal processes, personnel errors, system failures, or external events. In business operations, staff unfamiliarity with business processes or non-standard operations may lead to financing application review errors, incorrect fund payments, and other issues. An international bank once mistakenly transferred a $10 million supply chain financing payment to the wrong account due to employee operational error. Although the funds were eventually recovered through legal procedures, it still caused significant time and economic losses.

With the widespread application of information technology in finance, the security and stability of information systems face severe challenges. Problems such as hacker attacks, virus infections, and system failures occur frequently. Once they happen, they may lead to data loss and transaction interruptions, bringing huge losses to all supply chain participants.

Meanwhile, international financial service supply chains involve numerous laws, regulations, and regulatory requirements. Regulatory policies differ across countries and regions, and regulations are frequently updated. If enterprises fail to timely understand and comply with relevant regulations, they may face legal litigation and regulatory penalties. For example, the EU's General Data Protection Regulation (GDPR) has strict restrictions on cross-border data transmission, and non-compliant enterprises will face hefty fines.

3.4 Other Risks

Besides the main risks mentioned above, international financial service supply chains also face challenges such as political risk, legal risk, and natural disaster risk. Political risks include political conflicts between countries, trade protectionism, and policy instability. For example, during the China-US trade friction, tariffs imposed by both sides led to significant increases in supply chain costs, forcing some enterprises to adjust their global layouts or even exit markets. The rise of trade protectionism, such as setting technical barriers and import quotas, has seriously affected the normal operation of supply chains.

Legal risks mainly stem from differences in legal systems across countries and regions and constant changes in laws and regulations. In cross-border transactions, enterprises may fall into legal disputes due to unclear contract terms or improper legal application. For example, different countries have different definitions of breach of contract liability and compensation standards. If enterprises do not fully consider these factors when signing contracts, they may be at a disadvantage when disputes arise.

Natural disaster risks such as earthquakes, floods, typhoons, and other force majeure events cannot be ignored for their destructive impact on supply chains.

4. Risk Control Strategies in International Financial Service Supply Chains

4.1 Building Comprehensive Credit Evaluation Systems

Financial institutions should establish comprehensive and scientific credit evaluation systems to comprehensively assess the credit status of all supply chain participants. At the financial indicator analysis level, in addition to conventional core indicators such as asset-liability ratio and current ratio, dynamic indicators such as cash flow stability and accounts receivable turnover rate need to be deeply analyzed, combining DuPont analysis to build financial risk early warning models. For non-financial factor assessment, establish supplier cooperation relationship evaluation matrices to quantify dimensions such as enterprises' performance records in the supply chain, technological innovation capabilities, and social responsibility fulfillment; use text mining technology to analyze industry reports and news sentiment to capture potential reputational risks of enterprises[3].

At the technology empowerment level, build blockchain-based supply chain finance credit platforms, integrating multi-source data from taxation, customs, and judicial systems to achieve real-time transaction information recording on the chain. Introduce machine learning algorithms to build credit scoring models, achieving dynamic prediction of enterprise credit through training on historical transaction data. Meanwhile, establish data sharing mechanisms with international rating agencies such as Dun & Bradstreet and S&P, cross-validating external rating results with internal evaluation models to form a three-dimensional credit management system of "internal evaluation + external verification + dynamic monitoring." For enterprises with credit ratings of AA or above, revolving credit and extended payment terms can be offered; for enterprises with credit ratings below BBB, in addition to increasing financing costs, third-party regulatory warehouses need to be introduced for inventory pledge supervision.

4.2 Strengthening Market Risk Monitoring and Early Warning

Build multi-dimensional market risk monitoring systems, establishing monitoring dashboards containing macroeconomic indicators, industry prosperity indices, and financial market volatility. Use quantitative tools such as VAR (Value at Risk) and stress testing to conduct scenario simulations on variables such as exchange rates, interest rates, and commodity prices, setting red-yellow-blue three-level warning thresholds. Financial institutions and enterprises need to jointly establish cross-departmental market risk response teams, hold regular market assessment meetings, and formulate dynamic risk management strategies based on data from professional platforms such as Bloomberg Terminal and Wind Information.

In the application of financial derivatives, export enterprises can use combinations of forward foreign exchange contracts, foreign exchange options, and currency swaps based on collection cycles and exchange rate fluctuation characteristics. For example, for accounts receivable of 3-6 months, foreign exchange option combination strategies can be adopted to lock in exchange rate floors while retaining appreciation potential. Financial institutions can optimize asset-liability duration matching while transferring credit risk through the combined use of interest rate swaps and credit default swaps (CDS). Additionally, establish macroeconomic policy databases, using policy text analysis technology to track monetary and trade policy changes of central banks in various countries in real-time, adjusting asset allocation structures in advance.

4.3 Optimizing Operational Processes and Strengthening Internal Controls

Implement business process reengineering, using RPA (Robotic Process Automation) technology to replace repetitive

manual operations, such as automatic reconciliation and document verification, reducing operational error rates by more than 80%. Establish position separation and dual-person review systems, set multi-level authorization for key business nodes such as credit approval and fund transfer, forming a full-process control chain of "business initiation - risk review - compliance audit - leadership approval." Regularly develop employee operational risk case libraries, enhance risk identification capabilities through scenario simulation training, and incorporate risk prevention awareness into performance evaluation systems[4].

In information system construction, use microservice architecture to reconstruct core business systems, deploy network security equipment such as Intrusion Detection Systems (IDS) and firewalls, and establish remote dual-active data centers to ensure business continuity. Introduce zero-trust security models, implement least privilege access control, and encrypt sensitive data storage using the national cryptographic SM4 algorithm. Conduct quarterly information system penetration testing and vulnerability scanning, and hire third-party organizations to conduct information security level protection assessments. Meanwhile, establish operational risk event databases, use Root Cause Analysis (RCA) technology to analyze historical events, and continuously optimize internal control processes.

4.4 Strategies for Addressing Other Risks

For political risks, enterprises need to build country risk assessment systems, establishing evaluation models from dimensions such as political stability, policy continuity, and geopolitical conflicts, regularly issuing country risk rating reports. In supply chain layout, implement "China + N" diversification strategies to disperse policy dependence risks on single countries. In contract clause design, add flexible clauses such as force majeure and change of circumstances, and introduce the International Chamber of Commerce's "ICC Force Majeure and Hardship Clauses 2022" as supplements. By purchasing political risk insurance from international insurance companies such as AIG and Zurich, covering risks such as expropriation and exchange restrictions, insurance amounts should cover at least 120% of total project investment.

For legal risk prevention and control, establish cross-border legal expert databases to conduct special research on contract law, intellectual property law, and data protection law in different jurisdictions. In cross-border transaction contracts, clearly stipulate the application of the United Nations Convention on Contracts for the International Sale of Goods (CISG) or common law systems such as English law, and select neutral arbitration institutions such as the Singapore International Arbitration Centre (SIAC) or Hong Kong International Arbitration Centre (HKIAC) to resolve disputes. Establish intelligent contract review systems, using natural language processing technology to automatically identify legal risk clauses[5].

For natural disaster risk response, enterprises need to map global natural disaster risks, identifying risk exposure areas at key supply chain nodes. Establish strategic alliances with international logistics companies such as DHL and UPS, formulating multimodal transport emergency transfer plans. Establish tiered emergency response mechanisms, maintain 3-6 months of critical component inventory, and purchase property all risks insurance with business interruption coverage to include disaster losses in insurance coverage. Meanwhile, introduce technologies such as satellite remote sensing and meteorological big data to provide 72-hour advance warnings for typhoons, earthquakes, and other disasters, activating supply chain emergency switching plans.

5. Conclusion

International financial service supply chains play a crucial role in global economic development but also face challenges from various risks. Through accurate identification and in-depth analysis of various risks such as credit risk, market risk, and operational risk, and by adopting a series of targeted risk control strategies including building comprehensive credit evaluation systems, strengthening market risk monitoring and early warning, and optimizing operational processes while strengthening internal controls, the probability and extent of risk occurrence can be effectively reduced, enhancing the stability and risk resistance capability of international financial service supply chains. In future development, as the global economic environment continues to change and financial technology continues to innovate, risk identification and control in international financial service supply chains will face new opportunities and challenges, requiring all participants to continuously strengthen cooperation and innovation to jointly promote the healthy and sustainable development of international financial service supply chains.

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