

Financial Engineering and Innovation

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Abstract: With the continuous opening of the financial market, financial engineering has been paid more and more attention from theoretical research to practical application. Facing the fierce financial competition, how to maintain economic security and ensure stable economic development, to enhance the ability to prevent financial risks has become a worthy attention problem to research. This paper indicates the importance of financial engineering in the application of financial industry in China through a brief introduction of financial engineering, which leads to the following general description of the development of financial engineering technology in China. From the analysis of the role of financial engineering in financial innovation, it expounds the essence and principle of financial engineering from the economics perspective. And on this basis, the paper offer some suggestions and measures to promote the healthy development of China's financial engineering construction and gives some reasonable and specific improvement countermeasures.

1. Introduction

Financial engineering as a new discipline, with the help of numerical analysis technology, system engineering, operations research, artificial neuron and other technologies, Integrating modern financial theory with engineering management technology in the development of financial theory and practice,. It gradually developed into the frontier technology characterized by the innovation of financial products and the development of new financial technologies. In an increasingly complex international economic environment, financial engineering creatively provides methods and suggestions to solve all kinds of financial problems from innovative financial tools and technical means.

2. Overview of Financial Engineering

In the middle and late twentieth century, with the rapid development of the global financial industry, making the development of financial innovation more and more perfect and prosperous. Various new technologies and methods have been widely used in the financial field, and financial engineering has been born. There are many different definitions of financial engineering. Among them, the the most appropriate definition proposed by John finnery, a US financier. He believes that financial engineering includes the design, development and implementation of innovative financial instruments and give creative solutions to financial problems. In the era of increasingly integrated global economy, the financial industry has become the most active role. So whoever can take the initiative in financial activities will be invincible in the global financial competition. The implementation of financial engineering is almost becoming the passport to participate in international financial activities. In today's era of rapid economic development, financial engineering, is widely used in many fields, such as corporate finance, personal finance, risk management, etc. To sum up, financial engineering is the demand of economic development in today's era of rapid economic development, which shows its importance.

3. Development Status and Discipline Characteristics of Financial Engineering

In 1991, the international financial engineering association was established, continuously

developed the connotation of financial engineering. Some quantitative research tools and scientific methods are also widely used in the financial field, such as pricing model, portfolio theory, risk management theory, etc. It laid a theoretical foundation for the development of financial engineering, its development is not perfect, especially in China. As far as the current situation is concerned, China's understanding and application of financial engineering are still at a relatively basic stage. There are many obstacles and unstable factors that restrict the development of financial engineering in China. China must make changes If China wants to be the same as the United States in using financial engineering to avoid risks, so as to speed up the allocation and flow of funds, and further realize the ability to provide a full range of financial services.

From the perspective of management and risk aversion, financial engineering involves many aspects, such as accounting, auditing, law, taxation, marketing, etc.. Meanwhile, it also needs the help of modern mathematical technology, statistical methods, and computer technology to effectively reduce the uncertainty in financial management. Therefore, financial engineering can be classified as "innovation" in essence. Financial innovation not only needs to improve the financial environment from the system, but also from the innovation of financial products, to realize the scientific combination of financial derivatives such as futures, forwards, options, swaps and trading methods. In particular, the development of modern communication technology provides the technical basis for the innovation of financial engineering and the most reliable method for the construction of financial engineering discipline.

4. Related Principles and Applications of Financial Engineering

4.1. Principles of Financial Engineering

The application of financial engineering in China is still in its preliminary stage. In the process of designing and developing financial products, undoubtedly, financial engineers study and analyze the relevant principles of financial engineering, which has injected new vitality into the deepening of financial reform. For the understanding of the principles of financial engineering, we can classify them from the following five aspects

- 1) Transfer and redistribution of financial risks
- 2) Help enterprises avoid the restrictions of financial system
- 3) Exchange of comparative interests of advantage
- 4) Effectively alleviate financial information asymmetry
- 5) Application of liquidity principle

4.2. Application of Financial Engineering in Innovation

The essence of financial engineering lies in financial innovation and creation, the method is to use relevant financial principles, combined with specific financial problems and characteristics, to design a holistic financial service plan that meets the financial needs and takes into account the interests of all parties. For example, in the period of financial innovation, swaps, options, note issuance facilities, forward rate agreements, etc, to a certain extent, it meets the demand of customers for the refinement of financial products and risk aversion. But at the same time, we should also see that financial risks are also increasing under the increasingly fierce market competition. How can financial engineers design effective financial products based on specific situations, how to enhance the liquidity of financial products in the process of finding or acting as a counterparty, how to cultivate the trading market of financial products, etc, these bring forward new contradictions for financial engineers. Therefore, it is necessary to decompose and evaluate all kinds of risks faced by customers scientifically, so as to realize the effective choice and reorganization of the relationship between risk and return. And through the legal contract to give clear and standardized, in order to truly achieve the perfection of financial engineering construction.

The application of divestiture and hybridization in financial engineering, the core of financial engineering is to create a new relationship between risk and return. The common characteristics of financial product development are divestiture, decomposition and hybridization. The coupon on the

national bond is divested from the principal and sold separately, facing the interest payment national bond in the financial product. On the face of it, investors get a fixed interest rate, in fact, it's hard for them to get benefits. The first reason is that the transaction cost of interest payment treasury bonds is high, so the interest cannot be used for investment immediately; second, because of the uncertainty of interest rate, the investment behavior of investors is restricted. This is the "TIGR" financial product launched by Merrill Lynch in 1982, by using zero interest national debt instead of interest payment national debt, the shortage of interest payment national debt is effectively solved.

The application of indexation and securitization in financial engineering, in order to avoid the loss of financial products caused by market fluctuation in the financial market, stock index and LIBOR index are often linked with financial products. At the same time, in order to enhance the liquidity of financial products, securitization is also the development trend of financial product innovation in the future, such as the application of asset swap securities and asset backed bonds. The application of margin system in financial engineering, as an effective means to restrain both parties and reduce the risk of breach of contract. Its purpose is to ensure the legal performance of the financial market transaction process, also the application of margin system has greatly reduced the capital reserve rate of financial institutions. Therefore, it is necessary to establish a margin system to meet the development needs of the financial market industry, in this way financial risks can be effectively avoided and control, and actively play the role of financial engineering in the overall optimization of all stakeholders.

The application of business statement externalization in financial engineering, with the deepening of financial supervision, for financial institutions, with the help of financial engineering, they develop many financial products that are not reflected in the balance sheet. It can not only meet the profit demand of financial institutions, but also improve the structure of assets and liabilities. Therefore, innovative financial products are gradually recognized, familiar and accepted by customers. In 1981, in order to realize currency exchange with the World Bank, after continuous standardization, a set of simple and standardized currency conversion procedures has been formed. Thus, the transaction cost is reduced, the financial market is widened, and the development speed of financial products is promoted

5. Conclusion

The development of financial engineering should be based on a mature and stable financial environment, the development of China's financial market is not standardized, also needed to draw on advanced experience from the international financial field, so as to deepen the development of China's financial market. Therefore, first of all, we need to accelerate the transformation of government functions and improve the institutional environment for financial development from the behavior regulation of micro market subjects, to promote the innovation and development of financial engineering technology. Secondly, accelerating the establishment of a modern financial enterprise management system, guide the rational thinking of economic subjects to form a good and orderly competitive environment; third, learn from the management advantages of western capital markets, encourage the development of investment banks, which will play a leading role in the development of financial projects. Its pioneering nature and creativity are incomparable by other financial enterprises. Therefore, financing system should be improved the and other supporting arrangements to promote the rapid development of investment banks. In addition, we should accelerate the pace of innovation in the development of financial instruments, Improve the operation efficiency of financial engineering. At last, China has introduced various mature, high-tech means and models of financial engineering development from abroad. At the same time, we have to consider the particularity of China's economic market, according to the needs of the national situation, formulate and design the relevant investment strategies that meet the needs of the majority of small and medium-sized investors in China and adapt to the development of the economic market. In general, in addition to the above methods, we can also strengthen the construction of financial information system, improve the operation level of the financial sector; establish a financial risk prevention system and strive to avoid and resolve financial risks;

strengthen the innovation of financial engineering, and constantly strengthen the ability of financial industry to resist risks; pay attention to the cooperation of relevant departments, strengthen the credit system construction of the financial industry, etc. These are good countermeasures and suggestions for improving the development of financial engineering in China, As long as we study modestly, absorb the good and discard the bad ideas, financial engineering will have a bright future in China.

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