

# Theoretical System of Financial Econometrics and its New Progress

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**Abstract:** Financial econometrics is an important part of modern economics, and its application occupies a very critical position in the economic field. With the opening up of China to the outside world and the institutionalization of the market economy, the competition among domestic enterprises has become increasingly fierce and the integration of the international market has deepened. In such an environment, it is of great significance to conduct in-depth research on how to use advanced technical methods to solve practical problems. This paper firstly analyzes the theoretical knowledge of financial econometrics, and secondly, this paper elaborates the current research hotspots of financial econometrics and its new progress, hoping to promote the development of financial econometrics in China.

**Keywords:** Finance; Econometrics; Theory

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## 1. Introduction

The application of measurement technology in the field of finance is a popular research topic. As the level of science and technology and economic strength continue to improve, the demand for financial instruments is increasing worldwide, and traditional monetary valuation methods have been unable to meet the needs of modern society for diverse, flexible and high-quality financial information. China is currently in a stage of rapid development, but we still have a certain gap compared with the international. There are still many uncertainties in the capital market, which affects its application in financial measurement: first, the narrow financing channels of enterprises; second, the low activity of stock trading in the securities market; third, the lack of effective communication between investors and managers, which greatly affects investors' investment decisions; fourth, information asymmetry, which increases transaction costs. Starting from the basic theory of econometrics, this paper studies financial econometrics in our country.

## 2. Financial Econometrics Theory

Financial econometrics refers to reflecting the quality of accounting information by changing the value of assets. It mainly includes the analysis and evaluation of the amount of each item in the balance sheet and income statement and the changes of other items, and the trend of their changes as a basis, and then expressed in the form of financial statements; at the same time, it can also use cash flow indicators and other methods to calculate the total profit in the business activities of enterprises and the return on investment. Financial econometrics is an emerging discipline architecture theory in the field of accounting has made great progress in applied research. The study of financial econometrics includes the effectiveness of financial markets, volatility and risk measures of financial markets, analysis of the characteristics and structure of financial data and the measurement methods of financial markets <sup>[1]</sup>.

### 2.1 The Financial Market Effectiveness Hypothesis

In 1980, Modigliani and Miller proposed the hypothesis of financial market effectiveness. He argued that in an efficient securities market, free cash flows that are fully responsive to the trend of price changes by investors can be used for investment. When stock prices are overvalued, this indicates that stocks are more liquid. Conversely, if the stock price is undervalued resulting in illiquidity will cause it to lose its ability to fluctuate in price, thus affecting the assessed value of the firm, i.e.:risk-free return. In practice, there is

a phenomenon that when a company or an enterprise is in economic crisis, its production and operation activities will be affected, and even losses will occur, which will cause the deterioration of the company or enterprise's financial situation, bankruptcy and liquidation, thus making the financial market price does not accurately reflect the intrinsic value, which affects the normal operation of the financial market. Therefore, the measurement of off-balance sheet monetary values can effectively reflect the financial position and operating results of the enterprise.

## **2.2 Financial Market Volatility and Risk Measurement**

Financial market volatility refers to the economic performance caused by changes in the price of money, including interest rates, exchange rates and money supply. On a macro level, financial assets are subject to a large amount of uncertainty risk in the market. For example: in times of inflation or deflation, counterparties have difficulty predicting whether future cash flows will be abundant, which can lead to a crisis or even the collapse of a financial institution. On a micro level, it refers to changes in the level of financial management, business results and development prospects, as well as the possibility of a decline in corporate profitability. Therefore, in order to obtain a more accurate return value or risk indicator, the following points should be noted in the measurement: firstly, the changes in the data items reflected in the balance sheet and income statement and the reasons for the changes need to be analyzed accordingly. Secondly, forecasts should be made for some unanticipated financial instruments. Finally, market interest rates, exchange rates and other factors should be quantified to obtain a relatively accurate result.

## **2.3 Analysis of the Characteristics and Structure of Financial Data**

In financial econometrics, data are the most fundamental, that is, they are analyzed. In essence, it is the transformation of the real world into a mathematical model. (1) Data is objective. Financial assets and liabilities are expressed in various forms of information to represent the value of assets, risk and other attributes indicators, as well as other relevant factors of the interconnection and degree of influence between the magnitude of the relationship between the elements and the changes; There are also some non-quantitative contents, such as interest rate level, exchange rate, etc. (2) The data is relevant. Financial econometrics is to analyze and study the information, and then according to the conclusions drawn to formulate relevant policies, making it more perfect and scientific; at the same time, it can also provide some reference value and guidance for future economic activities. (3) The data is comprehensible, it is a conceptual model; that is, the process of interlinking financial assets with other relevant factors and forming a unified overall structure is called quantitative research method; And in this process involves the time value of money and price changes, interest rates and other issues are more complex, there is a certain degree of difficulty when you need to use mathematical methods for analysis and calculation.

## **2.4 Financial Market Measurement Methods**

The main international financial measurement methods are: option pricing models, cash flow methods and discount rate estimation techniques. (1) Option price valuation method. The model is based on the time value of money to discount the asset. When the market is in inflation, companies do not have inflows of money in the market, when they can be seen as bond investments or other items such as stock purchases. Conversely if there are large unrealized gains or losses then profits can be made by selling the cash flows from these items as discounted amounts; (2) Cash flow method. This model is based on the time value of money and interest rate discounting principle for balance sheet analysis. In times of inflation, companies can use their funds to purchase bonds to gain profits; when the market is in a period of deflation, one of the measures that should be considered to achieve certain gains by borrowing money to generate interest and loss of principal is the net profit margin estimation technique (i.e., return on investment). (3) Discount rate estimation technique. This method is used to determine the value of an enterprise by analyzing its operating conditions and combining the relevant data in the balance sheet and income statement. In practice, we can classify the enterprise's investment into three categories: long-term equity investment, short-term debt financing and non-current share financing; different measurement models can be used according to different types: such as cash flow method, variable interest rate model, etc.

## **3. Current Research Hotspots in Financial Econometrics and Their New Developments**

### **3.1 Thick-tail Phenomenon**

In financial econometrics, the thick-tailed phenomenon is mainly manifested in the following aspects: First, there are errors in the estimation of the value of assets. Because China has not yet introduced a set of unified and perfect quantitative standards and evaluation system to measure this problem, the asset valuation results often deviate significantly from the actual situation. The second is the occurrence of conditions such as inaccurate and unrealistic measurement of intangible losses due to underestimation of them. The third is that the use of new technologies or the adoption of new methods in financial instruments has led to devaluation or impairment, and these problems affect the practical application of financial econometrics [2].

### **3.2 High Frequency Data**

At present, the research on the theoretical system of financial econometrics in China has made great progress. However, due to the economic environment, technological progress and other factors still can not be fully developed in depth. High-frequency data refers to the large amount of unstructured and complex information that can reflect the process of change. In financial econometrics, there is an important concept, which is "frequency". It represents the frequency or log spectral density distribution of a time series (i.e. frequency volatility). (1) The estimation of high frequency parameters: firstly, the sample value needs to be determined; secondly, the corresponding probability distribution function is calculated based on the sample value; Once again, statistical methods are used to calculate information such as the relevant probability density function and correlation analysis results. Since these data are generated by mathematical econometric theory, they need to be subjected to the corresponding mathematical operations and modeled on this basis to produce the results.

### **3.3 Nonlinear Structure in Financial Market Data**

In the study of financial econometrics, we have found that factors affecting the accuracy and time lag of financial market data are very important. When a variable has multiple possible outcomes that are correlated with each other or are linked to varying degrees, this can lead to errors. These uncertainties are often referred to as "non-parametric" or "non-linear" structures (so-called nonlinearities). This phenomenon is mainly manifested in the fact that some variables cannot be solved by mathematical methods due to some objective reasons, such as interest rates, exchange rates and other influences that can complicate and obscure the data, which leads to the appearance of errors. Econometrics can effectively eliminate this uncertainty and reduce or avoid to a certain extent the negative effects of this influence on the accuracy and time lag of the data [3].

## **4. Conclusion**

Financial econometrics as a new discipline, it has a very important role in social and economic development. In China is currently undergoing reform, we must accelerate the establishment of a sound financial measurement theory system to adapt to the changes of the times, to meet the needs of enterprises and to provide more services. The following measures can be taken: First, strengthen the quality management of modern accounting information; Second, improve the ability of modern financial analysis, so that it can better contribute to the economic activities of decision makers; Third, strengthen the application of modern financial measurement theory.

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