Application of Financial Mathematics in Share Market Challenges and Future Ahead

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ABSTRACT

Financial mathematics in share market is the merchandise of applying mathematics to portfolio choice theory and option pricing theory. With the rapid development of the profitable situation, the products and derivatives of the financial industry are continuously optimized and innovative, and new financial goods and services are gradually increasing. The operation of financial markets, the blueprint and pricing of financial derivatives, and the analysis and supervision of risk become very imperative, and the research and development of financial mathematics is fetching more and more important. Therefore, it is of realistic significance to analyze the specific application of mathematics in the monetary field.

Financial mathematics, also called investigative finance, mathematical economics and mathematical finance, is an interdisciplinary focus of mathematics and finance that arose in the late 1980s and early 90s. Financial mathematics in share markets chiefly uses the modern mathematical theory and method (such as stochastic analysis, stochastic most advantageous control, portfolio analysis, nonlinear analysis, multivariate arithmetical analysis, mathematical programming, up to date computational methods etc.) of financial (including banking, speculation, bonds, funds, stocks, futures, options and other financial instruments and markets) analysis the number of theory and put into practice. The core problem is the selection theory of the optimal outlay strategy and the asset pricing theory under the doubtful condition. Financial mathematics not only have a direct effect on the novelty of financial instruments and financial markets in the share markets, drive efficiently, but also for the company's investment decision-making and assessment of project research and development (such as real options) and menace management in financial institutions has been extensively used.

Keywords: financial, mathematics, share, market, challenges, model

INTRODUCTION

Applying arithmetics to the financial field is based on some financial or economic assumptions, and uses abstract mathematical methods to build mathematical models of how the financial mechanism works. Financial mathematics chiefly includes the basic concepts and methods of mathematics, the associated natural science methods and so on.[1,2]

Financial mathematics

They are useful in various forms of entry theory. The use of mathematics is to convey, reason, and prove the fundamental principles of finance. From the nature of financial mathematics, financial mathematics is an important branch of finance in share market. Therefore, financial mathematics in share markets is completely based on the surroundings and foundation of financial theory. The people who slot in in financial mathematics through formal financial academic instruction will have more advantages in this context. Finance is used as a sub discipline of economics of identity development, though it has an attribute enough from the economic independence, but it still requires economic standard and economic technology related as locale. [3,4] At the same time, financial mathematics also needs fiscal knowledge, tax theory and secretarial principles as the background of knowledge.
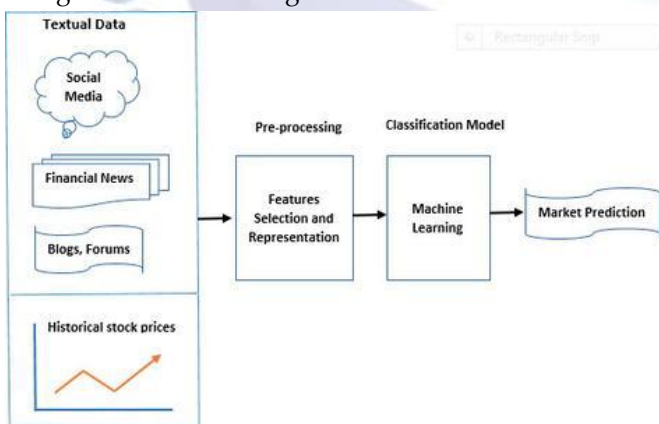
Financial news in stock market

In the modern financial theory, mathematics in the turf of finance is another important relevance is analyzed in option pricing and investment decision using discrepancy game method, [5,6] and the application of this aspect has made outstanding achievements.

Because the whole law of financial market does not harmonise with the hypothesis of steady state, the abnormal variation of securities will lead to abnormal alteration in the process of abnormal fluctuation, and this kind of variation will not obey the Brown motion. At this position, we need to use stochastic dynamic model to study and analyze the complete decision-making of securities investment. [7]
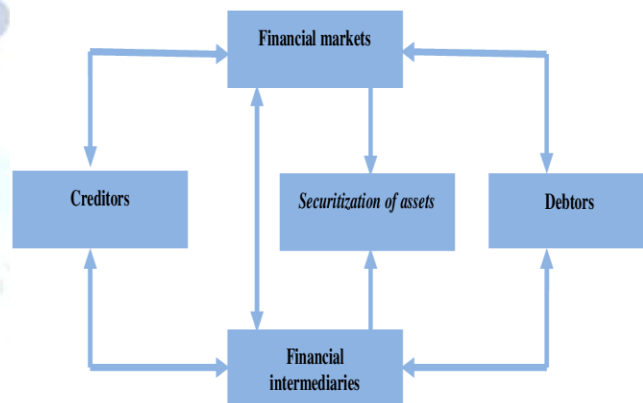

Fig. 1 Process of financial intermediation

This method is not only in hypothesis or in practice, but also has a enlarged deviation. The financial problems in share markets and interferences by using the differential method to non geometry in the financial field of the Brown allocation has important use, not only can effectively relax this postulation can also be uncertain disturbances become unreceptive to the illusion of hand. The stability (robustness) of the powerful portfolio strategy can be obtained through the engrossing analysis of the whole uncertain problem.[8]

OBSERVATIONS

The research of these scholars has unswervingly led to the emergence of the capital asset pricing (CAPM) model. As one of the prognostic model for risk assets based on expected profit equilibrium on the basis of CAPM, explains the configuration of market equilibrium in investors by Markowitz's theory of investment management under the circumstances of the theory of the relationship between the predictable return and expected risk in a simple linear relationship between the turn of phrase of it, that there is a positive link the relationship between a beta scale an asset to the expected rate of return and measure the risk value of assets.[9]

Capital Asset Pricing Model
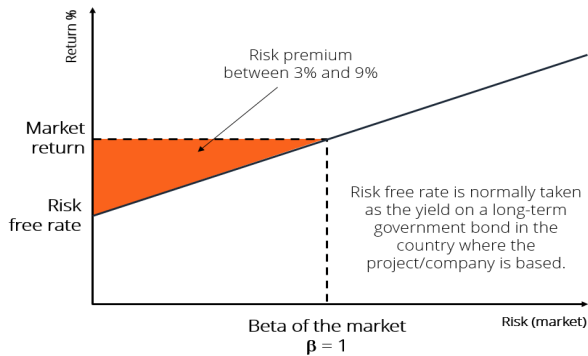
It should be said that, as a variety of objective of risk asset equilibrium price verdict theory, single index model, and based on CAPM not only simplifies the computation process of portfolio selection, the Markowitz portfolio assortment theory in the real world a big step forward, but also makes the securities theory from the previous qualitative examination to quantitative analysis, empirical turn from the normative, then the securities speculation theory and practical operation, which has an enormous influence even to the development of pecuniary theory and practice, has become the theoretical basis of recent finance.[10]

DISCUSSION

Stochastic optimal control is sophisticated in the development of the control theory gradually developed, through the relevance of Behrman principle in amalgamation optimization, measure theory and functional analysis method of stochastic quandary analysis. This method was formed in the late 60s of the last century, and became established gradually in the early 70s. From the application of stochastic optimal control theory, the rejoinder of financial experts in this field is very quick.[11]
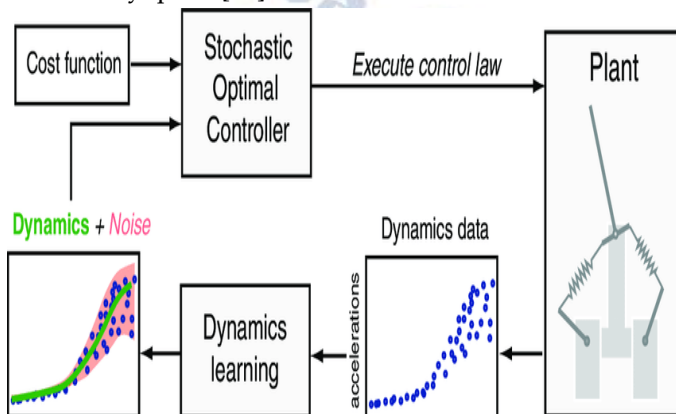
Stochastic optimal control model

At the beginning of 70s, the finance research field which appeared a few articles related to economics papers, including Merton (Merton) are discussed using the method of unremitting time consumption and portfolio, the portfolio analysis between them is additional consistent with the actual situation; and Brock (Brock) and Millman (Mirman) in random changes, using disconnected time method of optimal economic growth are discussed. Subsequently, the stochastic optimal control method has been applied in most financial fields in share markets.[12]

RESULTS

From the construction of differential game application, selection pricing and investment judgment in the capital asset pricing model and stochastic optimization theory to survey three aspects of the important application of mathematics in the ground of finance in share markets, reflects the significant role of mathematics in modern financial analysis. There are a huge number of things on which a bank may have risk, so they are grouped (categorised) into "asset classes".[13]

Share Market

The most common 5 types of asset class are:

1. **Interest rates.** These are the tariff at which individuals, banks, corporates and sovereigns (i.e. governments) borrow and lend money. Rates are usually quoted to the nearest 0.01% and range in term from overnight to 30 years or beyond.[14]
2. **Foreign exchange.** The rate at which one currency can be sold to buy another. If I have 1,000 pounds

and an overdraft of 1,400 dollars, then the net value is zero if the exchange rate is 1.4. If the rate goes to 1.39, then I have a net overdraft.

3. **Credit.** If I loan money to Argentina, then I should demand a much higher rate of interest than if I mortgage money to the UK, because there is a greater likelihood that Argentina will not repay its debt and I won't get my money back.

4. **Equities.** This is just a different name for shares, such as Marks & Spencer or Microsoft.

5. **Commodities.** Here we are chatting about tangible things like oil, gas, gold etc.[15]

CONCLUSION

As trades come closer to selling (the simplest deal can take 10 seconds from start to finish, more complex ones can effortlessly take 6 months) the trader will become increasingly involved. He is the human being who commits the bank to taking on risk, and will have jeopardy limits within which he operates. Ultimate responsibility for a transaction pricing falsehood with the trader. When a deal is done, the sales/structuring effort moves on to something else, and the seller is responsible for ensuring that the deal is managed throughout its life so as not to lose money. He will do so by "hedging" - performing bonus deals to minimise the net risks that he is exposed to. The mathematical skills in share markets of the trader depend very much on what type of risk he is tasked with managing. At the most technical end of the spectrum (so-called "hybrid" or "exotics" traders) it is a very practical task demanding clear understanding of pricing models and techniques. Ultimately, if a deal subsequently loses money, it is almost always the trader who takes the guilt.[16]

While the above description sketches the lifecycle of the deal, it gives no hint of the complexity of pricing that can be implicated. Just as in physics, the financial community develops models to describe how the various assets move and interrelate. This is the job of the "quant". If a transaction is complex, a quant will also be occupied in the pricing effort. He or she will advise on which models are appropriate (if any), and if none are suitable the quant may either propose not being involved with a trade (it being too risky or multipart) or will set about producing a new model.[17]

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