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Review Article: Optimization in Economics

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Abstract: Dynamic optimization is a simple idea, in order to solve a problem, we first solve the different parts of the problem and in the next step the sub-problem answers will be combined to provide a general and comprehensive answer to the whole problem. In simpler ways, the sub-problems are usually made in large numbers and each one is solved in many cases, but in this method only once the sub-problems are solved and the overlapping trait of the subsystems is used to prevent them from resolving them again, thus the volume of calculations are reduced. The response of each subsystem or sub-problem is stored and used in the next step, which is the same general answer to the problem. This method will be effective in cases where the number of the sub-problems increases exponentially. Therefore, the purpose of the study was to investigate the theoretical and research foundations that have been made so far on optimization in economics.

Keywords: Optimization, Productivity, Exchange, Decision Making.

Introduction

Dynamic planning is a method used to solve complex problems in mathematics, computer science, economics, and so on. This method first divides the problem into a simpler sub-problem and uses the overlapping trait among the sub-problems to determine the optimal value for the sub-problems, thereby reducing the time to solve the optimization problem than its simple solution (Brown & Smith, 2011). The basic idea of the dynamic optimization is a simple idea, in order to solve a problem, we first solve the different parts of the problem and in the next step the sub-problem answers will be solved and in the next step the sub-problem answers will be combined to provide a general and comprehensive answer to the whole problem. Therefore, the purpose of the study was to investigate the theoretical and research foundations that have been made so far on the optimization in economics.

Types of optimization and categorization issues

The purpose of optimization is to find the best acceptable answer, given the constraints and needs of the problem. For a problem, there may be different answers that are defined to compare them and select an optimal answer, a function called the target function. The choice of this function depends on the nature of the problem. However, the selection of the appropriate target function is one of the most important steps in the optimization. Sometimes, several purposes in the optimization are considered simultaneously; these kinds of the optimization issues that involve multiple target functions are called multi-objective problems. Each optimization problem has a number of independent variables that they are called as design variables. The purpose of the optimization is to determine the design variables, in such a way that the target function is minimized or maximized. The optimization issues can be categorized as follows.

One-dimensional optimization and multi-dimensional optimization

If there is only one variable in the optimization problem, the optimization problem is a one-dimensional and otherwise a two-dimensional problem.

Dynamic optimization and static optimization

If the cost function of the optimization problem is not a function of time, we will deal with a static optimization problem. But if the time also enters into the function, the optimization issue will be dynamic.

Constrained optimization

If the variables of the optimization problem are limited to a certain range (or constraint), we will deal with a constrained optimization problem, otherwise the optimization problem will be constrained.

To solve the constrained problems, we will use the following solution methods:

1. Total weighting method
2. Constrained ε method
3. Weighted metric methods
4. The Benson Method

We also use the following methods to solve unconstrained problems:

1. Newton's Method
2. Descending gradient method
3. Newton-like method

Continuous or discrete optimization

A discrete optimization problem is the one in which the problem variables have discrete variations in a given interval. While in a continuous problem, the variables in the given interval have continuous variations.

Single- objective and multi- objective optimization

One single- objective optimization problem has only one target function. In a multi-objective problem, the number of target functions that are simultaneously optimized is more than one function. Usually, in a multi-objective optimization problem, giving weight to each of the target functions and aggregating them, the problem becomes a single- objective problem.

Multi-objective (criteria) optimization

Multi-objective optimization is a subset of a set of multi-criteria decision-making methods (MCDMs), which is made up of an unlimited range of possible solutions. These are issues of the real world in which the decision maker faces a set of conflicting and contradictory purposes and criteria.

The general form of multi-objective issues is as follows:

$$\min F(x)=\{f_i(x),\ldots,f_n(x)\}$$
$$S.t: g(x)\geq 0$$
$$h(x)=0$$
$$x\in R$$

$f_i(x)$: The target function i of the multi-objective optimization problem
$g(x)$: The sum of unequal constraints of the multi-objective optimization problem
$h(x)$: The sum of equal constraints of the multi-objective optimization problem

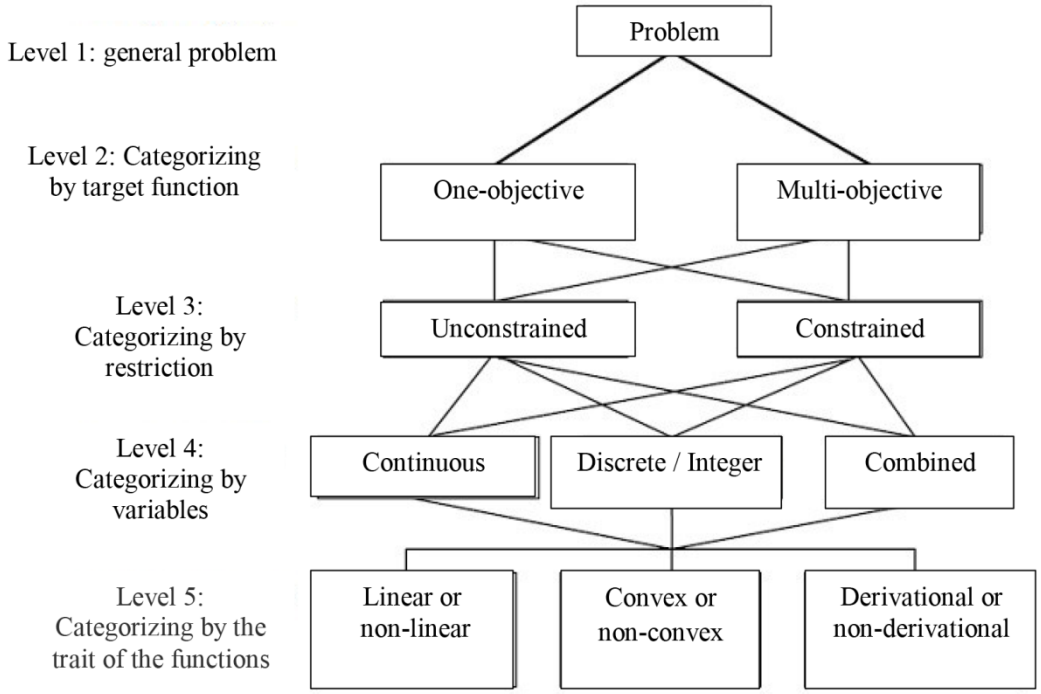

Figure 1. Optimization category.

Performance evaluation

Performance appraisal involves two basic steps: the first step in evaluating performance is to determine the desirability or undesirable performance. The second step is to determine if the performance is due to luck or as a result of expertise. Portfolio performance evaluation is important, which is an indication of how real a portfolio of operations has been based on the needs of investors. One of the main problems in performance appraisal is the desire of humans to focus on portfolio returns and not paying close attention to likely risks for the desired returns. Therefore, the performance evaluation should include simultaneous identification of the returns and investment risk (Mohammadi, 2010).

Transaction volume in stock market

In order to provide a good analysis, it is necessary to pay attention to transaction volume in addition to the price chart; in other words, the price index is the main index for analysis and the volume of transactions is considered as a secondary index. The volume of the transactions to the amount of the transactions performed in a given period is usually one day. The higher the volume, the more the stock will be active (Derakhshandeh, 2017). The volume of the transactions affects the stock prices and subsequently affects the returns. In the optimization, due to the description of the model and the method of dynamic planning, it is assumed that in each period, the investor can only reconsider his investment once, that is, at any time there is a possibility of buying and selling. The purchase or sale of shares creates a price for the investor, so the investor must, in view of the cost, choose his strategy to maximize the profit from his investment; therefore, in the used model, the transaction costs are considered according to the transaction made in each period (Rezazadeh et al., 2013).

The volume of the transactions shows the severity or urgency hidden in the price movement. The heavier transaction volume indicates more tendency or pressure. By reviewing the volume of the transactions with the price movements, analysts can measure the willingness or pressure to buy or sell in a better market movement. So this information can be used to confirm price movements or warnings that the price movements are unreliable (Hanifi & Gholamlou, 2014). There are two important proverbs in the stock market of the Wall Street Market: 1. This is the volume of the transactions that triggers price changes. 2. The volume of the transactions in thriving markets is relatively heavy and in the stagnant markets is relatively light. Studies in this area have been able to test these two proverbs well. A large number of empirical studies confirm the relationship between the volume of the transactions

and the absolute value of the change (the first proverb) and the positive relationship between the volume of the transactions and the price change (the second proverb) (Ziachi, 2014). From Karpoff's point of view, there are at least four reasons for the relevance of the transaction volume and stock price:

First, in the financial markets, the models are discussed which predict the relationships between stock volumes and stock prices in terms of the amount of information entering the market, how information is disseminated, the size of the market and the conditions stipulated in short-term transactions. In this way, clarifying the relationship between the transaction volume and stock returns through various tests, clarifies the views on financial markets and distinguishes different hypotheses about the market structure.

Second, it is important to be aware of how the volume of the transactions and stock prices are related to incidental studies, which use a combination of the transaction volume and stock price data to interpret them. The simultaneous determination of the price and transaction volume increases the ability to detect such tests. In other tests, the price changes are affected by the way the news is evaluated by the market, but the changes in the volume of the transactions mean the extent to which dealers agree or disagree on the quality of new information. In any case, the preparation of a test and the validity of its results depend on the distribution of the volatility of the price and the transaction volume.

Third, the relationship between the volume of the transactions and the stock price plays an important role in the empirical distribution of the speculation prices. When, during a given period, data are sampled at certain intervals such as daily, the rate of the return is more distributed than the normal distribution. This issue can also be due to the unpredictable variation of the rate of the returns distribution hypothesis, which can be attributed to the fact that the statistics provided are the result of different distributions with different variances (Hypothesis Composite Distributions or MDH2).

Fourth, the quality of the relationship between the volume of the transactions and the price changes has important implications for future market studies. The changes in the prices affect the volume of futures contracts and, in fact, include the idea that whether speculation acts as a price stabilization factor or that it will undermine the stability of future prices. The delivery time of the commodity in the futures contract affects the volume of the transactions and through this change, the prices will likely change (Hajiha, 2016).

What is important as the index and main criterion in the volume of the stock exchange in the stock market is the number of times and the average size of the transactions and the ratio of the turnover of the transactions.

Dynamic planning

Dynamic planning is a method used to solve complex problems in mathematics, computer science, economics, and so on. This method first divides the problem into simpler sub-problems and uses the overlapping trait between among the sub-problems to determine the optimal value for the sub-problems, thereby reducing the time to solve the optimization problem than its simple solution (Harrison & Waldron, 1998; Brown & Smith, 2011).

The basic idea of the dynamic optimization is a simple idea, in order to solve a problem, we first solve the different parts of the problem and in the next step the sub-problem answers will be combined to provide a general and comprehensive answer to the whole problem. In simpler ways, the sub-problems are usually made in large numbers and each one is solved in many cases, but in this method only once the sub-problems are solved and the overlapping trait of the subsystems is used to prevent them from resolving them again, thus the volume of calculations are reduced. The response of each subsystem or sub-problem is stored and used in the next step, which is the same general answer to the problem. This method will be effective in cases where the number of the sub-problems increases exponentially (Butt, 2012).

Discussion and Conclusion

The purpose of the study was to investigate the theoretical and research foundations that have been made so far on optimization in economics. Several studies have been conducted on the optimization in economics. For example, Fama and French (2015) in a research entitled describing abnormalities with a five-factor model examined the effect of adding two factors of profitability and investment to the three-factor model of Fama and French (1993). Their results indicate a positive correlation between the returns with profitability and investment, which this relationship is the returns on the stock redemption, which has few returns and beta fluctuations published by conservative investment companies, and, on the other hand, negative correlation between profitability and investment is due to the release of a stock with a large beta and fluctuating return invested by investable profitable companies. In his

research, Dhaoui and Nacer (2014) examined the effect of the optimistic and pessimistic tendencies and beliefs of investors on the trend and the volume of the transactions in the stock market. The results of this study, which is based on evidence from the French stock market and the CAC index over the period from 2005 to 2011, show that trend and volume of the transactions in the French stock market are sensitive to the feelings and aspirations of the investors. In general, the trend and intensity of the transactions tend to be more sensitive to pessimistic feelings. The research suggests that the investors should consider their feelings and desires and other investors as one of the most important factors in the stock market when making a decision. Fama and French in 2013 tested their new five-factor model in US bourse companies, and concluded that this model explains 69-93% of the periodic changes in returns on profitability and investment. With this presentation, B / M, Fama and French hope for additional model size portfolios, which, with empirical research in other countries, will be able to confirm its ability to be compared with the previous model. Pourahmadi and Najafi (2014), in a research entitled dynamic optimization of the investment basket with regard to the transaction costs: In the proposed algorithm, the main idea was based on the idea that the ultimate utility of the investor was maximized throughout the duration of the investment. Therefore, optimal percentages for the last investment period were found and then optimized for the previous period in order to maximize the utility of that period with respect to the return g from the previous period. The modeling performed in this study has been able to offer an appropriate investment strategy by using the breakdown of the optimal return function of the sub-problems to two functions without using complex mathematical estimates and equations, which can be considered as the superiority of the suggested model of this study compared to other methods and research done in this field. Hanifi and Gholamlou (2014) concluded in a study entitled "investigating the effect of the political cycle on the volume of the transactions and liquidity" that both the average volume of the transactions and the liquidity index follow the theory of the political cycle. In other words, the rate of liquidity index and the average volume of the transactions in the first two years of a state's ownership of the second two years is less than that of a government. The results also show that there is no significant difference between the rate of the liquidity index and the average volume of the transactions in the four years of the government ownership. Fallahpour et al (2015) found in a research entitled index tracer portfolio optimization using the sustainable single indicator model based on the index of 50 most active companies in Tehran stock exchange between 2012 and 2014 that out-of-sample test based on a pairwise comparison of the results of the portfolio returns of the index tracker derived from the sustainable model and portfolio index derived from the unstable model during the time interval showed that the index tracking error is a stable index and is significantly less than or equal to the unsustainable index of the portfolio tracking error, which results in the superiority of the sustainable model in generating an index portfolio.

Conflict of Interest

The authors declare no conflict of interest.

References

Brown, D. B., & Smith, J. E. (2011). Dynamic Portfolio Optimization with Transaction Costs: Heuristics and Dual Bounds. Management Science, 1752-1770.

Butt, N. (2012). Dynamic Portfolio allocation under Transaction Costs, Phd Thisis, University of Western Ontario, London, Canada.

Derakhshandeh, S. H. (2017). Assessing the role of investors' beliefs on the price and volume orientation of the capital market. Master's thesis, Islamic Azad University of Isfahan, Khorasegan Branch.

Dhaoui, A. B., & Nacer, K. H. (2014). Sensitivity of Trading Intensity to Optimistic and Pessimistic Beliefs. Arab Economics and Business Journal, 9, 115-132

Fallahpour, S., Tondnevis, F., & Mirhashemi, S. M. (2015). Optimization of the tracker's portfolio using a single indicator of sustainable index based on the index of 50 companies active in Tehran Stock Exchange. Quarterly journal of financial engineering and portfolio management, 24, 134-153.

Fama, E., & French, A. (2013). A Five-Factor Asset Pricing Model. Journal of Financial Economicshttp://dx.doi.org/10.1016/j.jfineco.2014.10.010, 1-51.

Fama, E., & French, A. (2015). Dissecting Anomalies with a Five-Factor Model.Electronic copy available at: http://ssrn.com/abstract =2503174.74-1.

Hajiha, Z. (2016). Improvement in the auditor's opinion and its effects on changes in the price and volume of stock transactions. Master's theses, Tehran Azad University, Tehran East Branch.

Hanifi, F., & Gholamlou, Q. (2014). Investigating the impact of the political cycle on transaction volume and liquidity. Quarterly Journal of Investment Knowledge, 3 (10).

Harrison, H., & Waldron, P. (1998). Risk aversion and portfolio composition. Mathematical Economic and Finance, 88-107.

Mohammadi, A. (2010). Several gray multi-criteria decision making in corporate performance evaluation. Master's thesis. Shiraz University. Faculty of Economics, Management and Social Sciences.

Pourahmadi, Z., & Najafi, A. (2015). Dynamic optimization of the portfolio with regard to transaction costs. Journal of Financial Engineering and Management of Securities, 6 (24), 152-172.

Rezazadeh, E., Fallah, S., & Listani, M. (2013). The effect of interest rate risk on investors based on transaction volume in Tehran Stock Exchange. Journal of Financial Knowledge of Securities Research, 6(17), 75-86.

Ziachi, A. A. (2014). Investigating the collective behavior of investors in Tehran Stock Exchange with an approach based on transaction volume of. Master's thesis. Semnan University, Faculty of Economics and Management.