Using Dynamic Programming in the Optimal Investment Decision-making Process in Iran Iron Mines companies

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ABSTRACT: Aim of this study is dynamic programming model application for the investment decision. Successful investments draw in capital and eventually the weight of capital will finally subsume the investment opportunity. This is the principle of the efficient market. But markets overshoot and undershoot and can be inefficient over long and variable periods of time. This is when skill in investment timing comes in. In this research used dynamic programming model and proposed optimal investment for all three Iron Mines that accepted in Tehran Stock Exchange since (2011 to 2012) and our investment is 0 to 5 million rials. results shows that Chadormalou mine company is best selection and it has most profitability.

Keywords: Optimal investment, decision making , dynamic programming , Iron Mines

INTRODUCTION

Investment decision making is very important and investor's problem is optimal and correct selection because mines have similar characteristics and your selection method is important subject, we using dynamic programming for optimal investment decision making. Hajihassani(2013) presented the relationship between working capita management and profitability: A case study of cement industry in Iran. The main objective of the study was to find whether financial ratios affect the performance of the companies in the special context of cement industry in Iran. This study empirically examines the relationship between working capital management and profitability by using data of 28 iran cement companies. The study is based on secondary data collected from financial reports which is accepted in Tehran Stock Exchange for the period of six years from 2004-2009. The data was analyzed using the techniques of correlation coefficient and multiple regression analysis. All the findings were tested at 0.01 and 0.05 level of significance. We found that the return on investment is very weak negatively correlated with the current ratio (CR) , inventory turn over ratio (ITR).While, ROI is very weak positively correlated with the liquid Ratio (LR) and credit turn over ratio (CTR).The results of other diagnostics suggest that the LR and CTR have a positive relation with ROI. On the other hand, LR and CTR both have a negative impact on ROI. However, CR relationship is insignificant with ROI, the relationship is not conclusive. Here is substantial decrease in the value of the R-squared that it shows the importance of ITR in the model. The result concludes that there is a weak relationship between working capital management and profitability in the specific context of cement industry in Iran. Rangriz and et al (2012) presented performance evaluation of Iran cement companies based on AHP and TOPSIS methods. A firm performance evaluation and its comparison with other companies can help the investors to reach the investment goals. Purpose of this study is representing manners which select the problem and solve ranking optimally by multi criteria decision making methods and by high ability. If the manners are combined correctly, by power keeping of each ways, its weakness will be offset by other powers. In this research, the method is measuring descriptive method and based on and practical applicable goals. For using conceptual model in the company's performance evaluation, statistical society is all cement companies which accepted in Tehran exchange markets since (1379 to1388). In this study, a combined method (TOPSIS- AHP) in the company's performance evaluation is presented by financial ratios. Financial ratios weights respected to views of different groups of experts are determined by AHP and thus, each ratio is used by its importance in the performance of firm evaluation and
ranking of each firm is determined by TOPSIS method. Based on implemented ranking, Ardabil and Azar Shahr lime cement company have the first ranking indicates that some criteria such as growth, profitability, liquidity, activity and financial leverage are combined method (TOPSIS-AHP) is better than uncombined one. Hajjhashani (2012) presented a comparison of financial performance in cement sector in Iran. At present cement sector is an emerging market. The most important reason of this is the increase infrastructure investments. Also performance of finance system, and increase in investments will affect the cement demand. Cement companies have wide impact on capital and credit markets of a country. Statistical society is all 28 cement companies which accepted in Tehran stock exchange. Study presents comparison of financial performance for the period 2006–2009 by using financial ratios and measures of cement companies working in Iran. Financial ratios are divided into three main categories and measures including two indicators. This work concludes that the performance of cement companies on the basis of profitability ratio is different than on the basis of liquidity ratio, leverage financial. Guncav and et al in (2008) presented Instantaneous optimal investment decisions with costly and costless reversibility. While many different theories have been put forward to explain investment behavior, they are all generally based on dynamic optimization, and there are a number of different methods available to solve such problems. In such models, the optimal values of the control and state variables, namely investment and the capital stock respectively, become forward-looking, dependent on the future values of both output and the factors of production, and on the (unknown) end period value of the capital stock. In this paper suggested a new method to obtain optimal investment levels without requiring information on the future, or end period conditions. Thus the optimal paths of control and state variables are obtained without needing to know future values of variables. Instead of maximizing the discounted value of the cash flows from unit capital accumulation over an unobservable future time interval as a performance index, the firm is assumed to maximize the current value of the cash flow of a unit capital accumulation at each time t. Chiarella and Hsiao (2010) suggested optimal investment strategies under stochastic volatility—estimation and applications. This paper studies the impact of stochastic volatility (SV) on optimal investment decisions. Considered three different SV models: an extended Stein/Stein model, the Heston Model and an extended Heston Model with a constant elasticity variance (CEV) process and derive the long-term optimal investment strategies under each of these processes. Since volatility is not a directly observable quantity, extended Kalman filter techniques are adopted to deal with this partial information problem. Optimal investment strategies based on the CEV volatility model are obtained by adopting the Backward Markov Chain approximation method since analytical solutions are no longer available. They find in the empirical investigation that the Heston model is favored as a more parsimonious model compared with the other two models. All three investment strategies based on the three SV models contain a positive inter temporal hedging term in addition to the static mean-variance portfolio. However, in their details the three investment strategies differ from each other. Also found that the investment strategies are sensitive to the CEV parameter. M. Zainashev (2011) presented using a genetic algorithm in the optimal investment portfolio decision-making process. This article looks at optimizing an oil company's investment portfolio based on a genetic algorithm (GA) gradient search. The algorithm is then integrated into a group decision-making process. Kuhlmann and et al (2011) presented dynamic programming algorithms for transition-based dependency parsers. They develop a general dynamic programming technique for the tabulation of transition-based dependency parsers, and apply it to obtain novel, polynomial-time algorithms for parsing with the arc-standard and arc-eager models. They also show how to reverse your technique to obtain new transition-based dependency parsers from existing tabular methods. Additionally, they provide a detailed discussion of the conditions under which the feature models commonly used in transition-based parsing can be integrated into our algorithms.

Aim of this study is using dynamic programming model for the investment decision in accepted in Tehran stock exchange Iron Mines companies.

MATERIALS AND METHODS

By dynamic programming problems can become very complex to simple problems and solve them with the optimal solution obtained. Basically, there is no standard framework for dynamic programming problems and it can be a particular problem in this technique. However, the general features of the dynamic programming model can be stated as follows:

Step: The problem of dynamic programming is illuminated with minor problems become whichever is called a phase. Each step is represents a decision-making position.

Status: Each stage consists of one or more condition. Decisions at each stage of the process is done to clear status.
Decision variables: At each stage, a decision from the current stage to the next phase transition takes place.

Optimal policy: Optimal policy represents the best decisions at every stage of the process to the final stage. Optimal policy with regard to all the circumstances of a step can be repeated and assuming all conditions optimal policy turns out to be later identified. In general, dynamic programming problems contain any information about the current state of the system is to determine the optimal policy for the remaining steps needed. This property is called the principle of optimality.

Recursive Relationship: At each step, the Recursive Relationship is used to determine the value of the optimal policy.
Backward: Regressive method is done from the step to previous step.
At each step is used the drawing table.
First back for the optimal solution and at any stage, we can the best decision (Fadavi, 2009).

In this research used dynamic programming model and proposed optimal investment for all three Iranian iron mines companies that accepted in Tehran stock Exchange. This study was conducted in Tehran stock Exchange since (2011 to 2012). function is \( F(n,i) = r(n,i,k) + f(n-1,i-k) \). In this research invested 0 to 5 million rials in three iron mines companies. Our research method is measuring descriptive method and based on practical applicable goals.

RESULTS AND DISCUSSIONS

We provided profitability companies from Tehran stock exchange that indicated in the table 1. This research will help to investors that they know companies and optimal decision making. Determination of where, when, how, and how much capital to spend and/or debt to acquire in the pursuit of making a profit. An investment decision is often reached between an investor and his/her investment advisors. Depending on the type of brokerage account an investor has, investment managers may or may not have tremendous leeway in making decisions without consulting the investor himself/herself. Factors contributing to an investment decision include, but are not limited to: capital on hand, projects or opportunities available, general market conditions, and a specific investment strategy.

<table>
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<tr>
<th>Companiess</th>
<th>Noor Saba Iron</th>
<th>Chadormalou Profitability</th>
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<td>12.45</td>
<td>50.31</td>
<td>35.67</td>
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We used dynamic programming model for optimal investment decision making. characteristics model are:
Step: it is three and the mine represents a step.
Status: value investing
Decision variable: it is investment on the iron mines companies.
Value of the optimal policy: \( \text{Max}\{\text{the total value}\} = \text{Max}\{\text{current value} + \text{The next stage is the optimal value}\} \)
Solution from step3 has started:

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In the table 4 showed optimal investment that it is Chadormalou Mine because Chadormalou Mine has most benefit and investing all 5 million rials in the Chadormalou Mine company. Investors should total 5 million to invest in company Chadormalu to earn profit of 50.31 rials. That this is the highest profit among other companies. research correlation with the recent reviews is dynamic programming model and optimal investment methods. there used dynamic programming model for optimal investment in Iron Mines companies that is innovation. our research statistical society was accepted Tehran stock exchange Iron Mines companies.

We apply different methods for optimal investment. It is suggested that future research can use TOPSIS, AHP methods and the others methods until Investors can choose the best companies for investment. It is suggested that the rankings compared with other methods and the Results be evaluated. The company managed to create competition occurs and other companies can identify their weaknesses and eliminate weaknesses and could compete with other companies.

REFERENCES


