Available online at www.sciencedirect.com

ScienceDirect

Procedia - Social and Behavioral Sciences 219 (2016) 688 – 693

Procedia Social and Behavioral Sciences

3rd Global Conference on Business and Social Science-2015, GCBSS-2015, 16-17 December 2015, Kuala Lumpur, Malaysia

Monte Carlo on Net Present Value for Capital Investment in Malaysia

Siti Salihah Shaffie[a] *, Saiful Hafizah Jaaman[b]

[a]*Faculty of Computer and Mathematical Sciences,UiTM Perak kampus Tapah, 35400 Tapah Road, Perak, Malaysia*
[b]*School of Mathematical Sciences, Faculty of Science and Technology, University Kebangsaan Malaysia, 43600, Bangi, Selangor, Malaysia*

Abstract

Capital investment becomes crucial investment decision in uncertain economic environment need to be made. Two major pitfall of classical net present value are uncertainty and managerial flexibilities. These drawbacks lead to imprecise cash flows estimation. This study proposes the employment of the Monte Carlo method in the NPV model in order to achieve reliable cash flows estimation. Monte Carlo provides the risk analysis which can be adopted by investors in making capital budgeting decisions. Result of this study found that Monte Carlo is an appropriate tool to embed in NPV model.

Peer-review under responsibility of the Organizing Committee of the 3rd GCBSS-2015

Keywords: Capital budgeting; cash flow estimation; Monte Carlo simulation; net present value; risk analysis

1. Introduction

Capital budgeting is a planning process of analysing investment to determine the value of a long term investment to a firm. Capital investment aims to maximize the wealth and value of the firm through the continuous profit obtained from that particular investment. For that reason, capital investment decisions are crucial for firm's survival and sustainability in the future.

* Corresponding author. Tel.: + 60125635636
E-mail address: salihahshaffie@gmail.com

Peer-review under responsibility of the Organizing Committee of the 3rd GCBSS-2015
doi:10.1016/j.sbspro.2016.05.052

Various techniques have been developed and improved to assist in capital investment valuation. Early studies focused to the number of years needed to get back the cost of capital. Hence, the payback period technique which is simple and easy to understand is used by many firms and organizations (Singh, Jain, and Yadav 2012). However, this technique's major pitfall, it ignores the time value of money (Boyle and Guthrie 2006).

One of the powerful tools used in capital budgeting analysis is the net present value (NPV). It is considered as theoretically correct for it to adopt the difference for time value of money (Bennouna, Meredith, and Marchant 2010), and yet, net present value has two major discrepancies. First, the uncertainty of cash flows estimation from the investment. In this matter, cash flows for more distant future may be discounted at a higher rate for high risk project and consequently may lead to undervalue the project (Liao and Ho 2010; Ho and Liao 2011). Second is the managerial flexibilities that implies to the timing for the decision makers to make a decision to invest. This classical net present value assumed that the investment is irreversible and must be executed immediately until the end of the project's period. Despite the positive valuation from the model, the investment actually can be delayed for new information which reduce the downside risk and undesirable outcome (Liao and Ho 2010; Appadoo 2014; Wilkinson 2006).

The application of Monte Carlo simulation reserve wider context of cash flows estimation in capital investment valuation. Monte Carlo simulation is adopted to solve incomplete information and allows decision maker to better understand of risk and uncertainty in discounted cash flows estimation. The purpose of this paper is to present a preliminary study to evaluate public capital project using classical Monte Carlo simulation. The paper is organized as follows. Section 2 briefly reviews some previous studies on capital budgeting valuation. Section 3 describes the Monte Carlo net present approach used in this study. Section 4 illustrates project valuation using the proposed approach. Finally, Section 5 is the conclusion.

2. Motivation of the study

Payback period is widely employed by many firms (Verbeeten 2006; Leon, Isa, and Kester 2008; Drakota et al. 2011). This method is simple, require less cost, less commitment and easy to understand. This method is frequently used to determine how soon firm will be able to get back its cost of capital. Shorter payback period is preferable than longer period. The payback period of an investment will influence investors in decision making. Investors may ignore potential investment with later payoff stream (Shaari Isa 1994; Wambach 2000). Major pitfall of the payback period is that it does not consider discounted cash flow, thus long term investment fail to reflect the actual value of its return (Shaari 1994). Many later studies intended to improve the flaws in this technique, mainly to capture the deficiency in non-discounted cash flow (Shaari Isa 1994; Wambach 2000; Boardman, Reinhart, and Celec 1982; Boardman 1985; Yard 2000). However, the improvement made to the payback period method only increase the complexity of the calculation and is best used as secondary tools to support other discounted cash flows tools (Dobbs 2009; Boyle and Guthrie 2006).

On the other hand, classical net present value technique ignores the uncertain of cash flows and managerial flexibilities which may undervalue potential investment and misled decision makers (Liao and Ho 2010). Therefore, the improvement of classical net present value via sophisticated techniques can reduce discrepancies in its formula. Payam Hanafizadeh (2011) presented an IT approach to encounter the ambiguity in cash flows in NPV method. The computational approach generates 10000 random scenarios which presented certain region of NPV. This model incorporates covariance of historical data with the purpose to assist investors in making better decisions.

Tsao (2012) proposed fuzzy concept in mean, standard deviation and cost of capital. The study developed an algorithm to deal with unequal durations and risk. Huang (2007) proposed investment outlays and annual cash flows as fuzzy variables. The study employed fuzzy simulation based on genetic algorithm procedure. The employment of fuzzy simulation is used to calculate the objective value and the value of credibility. Credibility measure is suited to represent the occurrence of fuzzy event. On the other hand, genetic algorithm procedure is used to find the optimal solution of the capital budgeting problems. The proposed model increased time spent on fuzzy simulation due to high number of fuzzy variables involved.

Liao and Ho (2010) presented real option concept in capital investment valuation. They proposed extended fuzzy net present value (EFNV); obtained from the classical net present value and option value of the investment. Fuzzy number was adopted to estimate the possibilities in binomial option tree and estimate the net present value from the investment.