

**Correspondence**

Keabetswe Ramantshane
School of Business Leadership (SBL),
University of South Africa (UNISA), Pretoria,
South Africa.

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Role of Optimal Investment Timing using Real Option Valuation to Support Foreign Direct Investment Decision Making

Keabetswe Ramantshane

School of Business Leadership (SBL), University of South Africa (UNISA), Pretoria, South Africa.

Abstract

There is an essential need for developing economies to attract foreign direct investment, reduce capital expenditure for the country. However, the need and expectation of such may be essential to encourage infrastructure development in Low Developing Countries (LDC's). Regional integration has not been explored optimally in the African Context. In this research different models such as the Optimal Investment Timing (OIT) using Real Option Valuation (ROV) to support decision-making in Foreign Direct Investment (FDI) for economic sustainability assessment are being explored. For comprehension of the project the Option Pricing Model (OPM) using the Black-Scholes model applied for model performance. The applicability of the model requires two Monte Carlo simulations to satisfy a Markov process and a Wiener process to determine the position of the buyer's market. Real options valuation can be influenced by the volatility of cash outflow, as well as the volatility of cash inflow. The real options valuation method proposed in this study contributes to the literature in applying the model, taking into consideration investors that maximize project profitability for economic sustainable development.

Introduction

With the policy framework, FDI's is the key driver of international economic integration to promote economic development [1] which can be achieved through structured finance, as such that government offer significant inducement to attract inward investment for cross-border initiatives [2]. Furthermore, in comprehending understanding on the nature of assets which are targeted for equity share through FDI acquisition, assets have their own lifecycle which can reach saturation. Noting that Investors have no control on their return on investment (ROI), expanding infrastructure growth in LDC's requires predictive analysis to project the desired ROI by applying matrix modelling. This can be achieved through technology diffusion in the process of economic development inclusive of the adoption of foreign technology whiles committing to FDI acquisitions [3].

One of the critical factors for a successful portfolio is the need for investor knowledge for country policies. Growth rate of FDI for low developing countries is to be monitored at proximity to ensure continuity of the investor's interest and consistency of the development. Additionally, for effective structured finance, most private institutions choose corporate finance as opposed to project finance due to having direct control of the management of the project's capital [4]. Studies in relation with Public and Private Institutions currently use the methodologies and mechanisms of

infrastructure financing through the needs of corporate finance and project finance which at times is embedded into the corporate finance structures [5].

Often project finance is defined as a legally independent project company financed with nonrecourse debt or limited recourse financing [4]. According to Finnerty, Nevitt and Tiong and Jahidul, Project Finance signifies an off-balance mode of providing medium and long-term capital for capital intensive project financing which requires an existing capital structure where project assets and cash flow will cover all obligations resulting from liabilities, as such that interpretation of assets and liabilities needs to be taken to consideration [6-8].

Investment portfolios explores matrix modelling, with the objective to achieve the best projections for Return on Investment (ROI). The optimal investment timing model is applied exploring the real option valuation of the asset [9], OIT is an estimable predictive model for delivering ROI at a projected time through ROV, asset growth projection is then articulated.

$$ROI^n = (OIT \times ROV) \sum_{k=0}^n \binom{n}{k} OIT^k ROV^{n-k}$$

Infrastructure projects typically involve very high levels of capital investments and the generation of steady-state revenues from these projects which may take few years. This is then comprehended by using the option pricing

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model [10] through black-Scholes for performance tracking. Infrastructure projects require land acquisition of which government intervention may be required, and at times the private investors need to make decisions of such requirements [5], by utilising ROV to determine projection for their ROI for their investment portfolio.

$$(OIT \times PV)^1 = \sum_{FDI=k}^{ROV} \left(\frac{ROV}{OPM} \right) ROV^{n+k} \times ROV^{n-1}$$

Most Infrastructure projects are dependent on government decision making for them to be a success, this can be achieved through the Monte Carlo simulation to satisfy a Markov process and Wiener process to retain investment portfolios from private partners. The Build, Operate, Transfer (BOT) techniques is the most frequently used project financing capital intensive framework, in lieu of nurturing the project development life cycle [11]. BOT was established in Turkey in the 1980s to cater for infrastructure projects within limited delivery time [11].

According to Kosov, et al., Russian and foreign partners' enterprises use different kinds of models to fund the projects: subsidies from the Investment Fund, subsidies from federal and regional budgets, and private investment [12].

FDI's is an important vehicle for the transfer of technology contributing to the growth of larger than domestic investment [3]. Gharaibeh encourages the use of regression models which finds FDI inflow increased by better infrastructure, higher return on investment (ROI), and more trade openness [13]. Moreover, this study indicates that negative correlation exists between FDI inflow, on the one hand, and greater trade barriers, repressive taxation.

In an efficient market, the Present Value (PV) completely reflects the past record of asset prices and further utilised as a tool to project the ROV with the objective of achieving OIT as the market reacts directly to the latest information about the asset [9]. Zhao and Tseng, alludes that over time the asset price is said to follow the Markov process [10]. The variables that change with uncertainty in the continuous time process follow the stochastic process, which represents the state of the economy, such as the price of an equity or the demand for a product [9]. The process of changing these variables is called the Wiener process, which is a probability process with an annual mean of 0 and an annual variance of 1.

Therefore, for the evolution of FDI and consistent generative dividends in the region, matrix modelling enforcement will generate a more favourable projection on ROI. Noting that, ROV in alignment with OIT generates accurate projection for ROI. FDI for LDC's can record extensive return on investment when multiple models applied, through these models an

enhancement of generative investors is then attracted for economic sustainability.

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