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Benefit of Using Real Options in a Capital Budgeting Project for Fintech

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Abstract. This paper intends to explain the use of real options in fintech (financial technology). Fintech has become a new phenomenon in the financial industry today. Since Alibaba's aggressiveness with various e-commerce products that have penetrated various parts of the world, many conventional financial industry institutions such as banks have begun to convert their traditional service products into digital service products. Once the expansion of fintech has multipurpose uses because it is not only a form of product innovation in the banking world, fintech also has a useful purpose in helping the incubation effectiveness of many startup companies. As in the example of a bank industrial project [(see Lee & Shin (2018)] which analyzes the effectiveness of a fintech project with a 3-year business period using traditional methods using NPV, this project experiences rejection because the NPV results are low then this project should not have been done, but a fintech project that has a very high urgency and commercial value so that from a business perspective it demands to be done. So addressing this, researchers in the field of financial management develop a more sophisticated capital budgeting method, a real option. Real options have a higher flexibility compared to NPVs which only depend on the accuracy of the calculation of cash flow, discount rate and time horizon of the related project. The flexibility of the real option is the determination of a scenario that is more suitable for the characteristics of the project. This scenario is built based on the widely used binomial method in statistics; with its emphasis on developing the situation for successful and failed projects. With this real option method the fintech project that is considered uncertain remains an implementation scenario.

Keywords : Fintech; Capital Budgeting; NPV and Real Option

INTRODUCTION

To achieve maximum results in capital budgeting, it will depend on the method chosen. Various capital budgeting feasibility methods are used, ranging from payback period, IRR, and NPV. The NPV method is almost recognized as the best method because it logically calculates the time value of money in capital budgeting. However, in its development, the NPV method has been criticized because it can only be applied to conventional projects with a low risk tolerance level. In addition, there are many conflicts with the IRR method for some types of projects. In the era of disruption, according to Gai, et al. (2018), which is starting to emerge with the latest projects with a high tolerance level, the NPV method alone is not enough. This is because for the newest projects with a high risk tolerance level, the analysis of the nature of the calculation of cash flow, time horizon, and discount rate must be changed from deterministic to probabilistic. A commonly used method is called real options, which is actually an extension of the NPV method by simply incorporating elements that penetrate the decision tree. In this decision tree analysis, managers will be able to determine the best scenario in a selected project execution.

Meanwhile, in Indonesia, there is a company established by Bank Mandiri that dedicates its business to developing both conventional startups and fintech companies. This company's business model resembles a venture capital firm with a foster parent system, but over time, it has evolved into a business model similar to typical fintech

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startups, encompassing wealth management, capital markets, crowdfunding, lending, and insurance. Danusaputro (2018) states that the company, called Mandiri Capital Indonesia, remains the most advanced company in the Indonesian fintech industry.

Based on the description above, this short article will attempt to explain the potential of fintech companies, often perceived as very high risk and close to failure, by comparing capital budgeting aspects based on a study by Lee & Shin (2018). Two methods are compared: Net Present Value (NPV) and Real Options (RO). Discussions on the effectiveness of RO are already available in the financial management literature.

MATERIAL & METHOD

1. Real Option Concepts & Practices from Lee & Shin (2018)

Lee & Shin (2018) applied the real options method to investments in technology projects. One reason is the weakness of the traditional Net Present Value (NPV) method, which ignores investment flexibility such as delays and expansions within a certain timeframe. NPV tends to only calculate the project value at a higher discount rate and is irrelevant for high-risk, uncertain technology projects. Because many financial projects are experimental and developed in a dynamic economic and regulatory environment, real options will be more relevant than NPV.

Basically there are four types of real options according to Robins (2003), Kumar (2005) and Ting & Li (2008), namely:

(1) Deferred Option, which gives management the option to wait or learn more to see if a project will be profitable.
(2) Extending Option, which gives option management to invest more in profitable projects.
(3) Leaving options, which give management the option to abort projects that operate at a loss and sell or move assets.
(4) Contract Options, which gives management options to scale back projects that operate at a certain level of loss.

2. Execution Method i.e. Real Option from Lee & Shin (2018)

The use of decision tree analysis in real options offers methodological advantages because it can accommodate various types of project scenarios according to management beliefs and simulation results. This approach is considered more imaginative for decision-makers, as the decision tree structure allows for clear visualization of potential outcomes and rationale for determining realistic solutions. Unlike other real option pricing models, which tend to rely on restrictive assumptions, decision trees offer a more adaptable analytical framework to real-world conditions.

Several studies have shown that applying decision trees can yield comparable values to binomial-based option pricing methods, as long as the risk level is determined consistently across all branches of the tree (Frichman et al., 2005). However, determining this risk is not simple and requires careful and systematic analysis. Through decision trees, project value can be calculated by identifying the most feasible value, determining the optimal timing for option exercise, and performing a backward discounting process to obtain the overall option value. In practice, decision trees can be presented manually or with the aid of software. Manually, decision trees are typically described in diagram form based on Bayes theorem, allowing for clear exploration of the probabilistic relationships between scenarios. However, using software typically requires first creating a tree diagram,

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which is then converted into a spreadsheet to facilitate more efficient calculations of project and option values. Thus, decision trees serve not only as an analytical tool supporting strategic decision-making but also as a scientific approach that bridges theory and practice in real world options valuation.

RESULT & DISCUSSION From Lee & Shin (2018)

1. Without Real Option

Within an investment strategy framework, a bank planning to develop a Peer-to-Peer (P2P) lending project can use a real options approach to assess potential business expansion. Consistent with the views of Copeland and Antikarov (2003) and Lee and Lee (2015), the present value of a project without options serves as the underlying asset in real options valuation. By establishing basic assumptions, such as cash flow projections, discount rates, and risk volatility, the bank can conduct a more comprehensive evaluation of the project's value. This approach allows management to identify optimal decisions regarding implementation timing options and more realistically assess investment feasibility. Some basic assumptions for related evaluation:

1. The finance project generates cash flows of $ 100 million at T0.
2. The initial investment for the fintech project is $ 330 million at T0. Initial investment will be sufficient for the project's maximum market growth potential.
3. The expected annual growth rate is 16%. In each period, cash flow will increase by 60% with a probability of 0.6 and cash flow will decrease by 50% with a probability of 0.4.
4. The annual discount rate is 3%. For simplicity and comparison purposes, it is assumed that the discount rate with real options and without real options is the same. In fact, the risk-free discount rate for real options must be far lower than the discount rate for projects without real options.
5. There are two periods (T1 and T2) on the decision horizon for this project. After the project ends at the end of T2, the project has no value and a new technology project is taken over.

Based on the assumptions above, the project value can be calculated without the real option in table 1 below.

Table 1. Calculation Results Without Using Real Options

Time	Expected Cash Inflow in Present Value	Investment without Real Option	Net Present Value (NPV)
Period 0	$ 100,000,000	$ 330,000,000	
Period 1	$ 112,620,000		
Period 2	$ 125,300,000		
Total Period	$ 337,950,000	$ 330,000,000	$ 7,950,000

Source: adaptation from Lee & Shin (2018)

Based on the above tabulation, the project value is obtained at $ 7.95 millions or approximately only 7.95% of the initial investment value. Of course, seeing a result of 7.95% is still far from the expectations of decision makers. Therefore, a more sophisticated method of real option is indeed needed and to execute this method several data settings are needed as in the NPV method [see Hill (2018)].

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2. With Real Option

Furthermore, Lee & Shin (2018) use real options to evaluate the investment of this project with an option to expand. The options to expand are set as follows:

1. Initially, there was an investment of $ 110 million for initial cash flow of $ 100 million.
2. If the first period has a cash flow of up to $ 200 million, $ 110 million is invested to develop. If cash flow is below $ 100 million, there is no option for expansion.
3. If the second period has a cash flow of up to $ 300 million, $ 110 million is invested to develop. If cash flow is below $ 200 million, there is no option for expansion.

Table 2. Calculation Results Using Real Option

Time	Expected Cash Inflow in Present Value	Investment without Real Option	Net Present Value (NPV)
Period 0	$ 100,000,000	$ 110,000,000	
Period 1	$ 112,620,000	$ 64,080,000	
Period 2	$ 125,300,000	$ 37,330,000	
Total Period	$ 337,950,000	$ 211,410,000	$ 126,540,000

Source: adaptation from Lee & Shin (2018)

Looking at the data in table 2, the maximum result is the NPV of $ 126.54 millions for the project to be executed. Or if it is measured by the percentage number it will get 126.54%. Obviously the real difference between valuation methods in capital budging without real options using real options. This difference in value of 118.59% occurs because of the ability to expand options which reduce investment costs by utilizing decision tree scenarios.

That is as shown in table 2, then for period 0 the amount of investment is only $ 110 m, and then followed by period 2 of $ 64.08 m and period 3 of $ 37.33 m whose value is far below the value of investment costs when using the usual NPV method. Investment costs must be calculated in period 0. This study results beside Lee & Shin (2018) also confirm the success of Benarich & Kauffmann (2000) and Dewi & Tirok (2010) which found the effectiveness of real options in case of electronic banking network expansion and bank acquisitions in the period before 2010 respectively.

CONCLUSION

Given the potential for fintech growth, a real options based capital budgeting method should be prioritized over the conventional NPV approach. This method offers higher returns by considering various scenarios, including expansion options, contracts, delays, and project contractors. This flexibility provides greater confidence for decision makers, especially since investment costs can be reduced at each evaluation period. The choice of real options depends on the specific project situation and the characteristics of the surrounding industry. Therefore, the results of this study are not only relevant to the fintech sector but can also be applied more broadly to various business cases, including start ups.

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