THE PERFORMANCE OF MODIFIED INTERNAL RATE OF RETURN FOR EQUITY INVESTMENT ASSESSMENT: A MARKOV CHAIN APPROACH

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by

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LIST OF ABBREVIATIONS

B	The company is not doing well
DCF	Discount Cash Flow
dps	Dividend per share
ESOS	Employees Stock and Options Scheme
G	The company is doing well
IRR	Internal Rate of Return
MB	The Market-to-Book ratio
MIPS	Malaysian Industrial Products and Services
MIRR	Modified Internal Rate of Return
MLE	Maximum Likelihood Estimate
NPV	Net Present Value
PE	The price to Earnings ratio
RM	Malaysian Ringgit
TPM	Transition Probability Matrix
WSJ	Wall Street Journal website

LIST OF SYMBOLS

t	Discrete yearly time series
X^c	Closing of stock price
ΔQ	Close price change
Z	Discrete random variable for classified of close price change
i	Present state
j	Future state
C	Yearly fixed contribution
$u_{t,1}$	Date of share purchased and sold
$u_{t,2}$	The date of the financial year report published
$\Pr_{u_{t,1}}$	Share price on date $u_{t,1}$
$\Pr_{u_{t,2}}$	Share price on date $u_{t,2}$
B_t	Cash Balance at year t
$DIV_t^{(1)}$	The dividend obtained from the existing share units
$DIV_t^{(2)}$	The dividend earned from the new purchased share units
DIV_t	The whole of dividend at year t
i_m	Modified internal rate of return
$S_t^{(1)}$	Accumulated share unit before share issuance at the end of year t
$S_t^{(2)}$	Accumulated share unit after share issuance at the end of year t
E_t	Share units at time t

d_t	Dividend per share at time t
Spl_t	Share split at time t
Bns_t	Bonus issuance at time t
D_t	Consolidation at time t
g_t	Issuance function at year t
C_t^*	Annual contribution in investment over T
$F(T)$	Terminal value invested fund to be let at the end of year T
a_t	Integer number
NPV	Net Present Value
X_t	Random variables
r	Number of states in the transition matrix
k	Discrete States series
$\prod$	Product over a set of terms
$\mathscr{P}$	Probability
p_{ij}	Term of transition probability from a state i to state j for all time
$p_{ij}(t)$	Term of transition probability from state i to state j for a period at t
$\mathbb{L}$	Maximum likelihood
$\boldsymbol{P}$	Transition probability matrix for aggregated matrices
$\boldsymbol{P}(t)$	Transition probability matrix for a period at t
$\boldsymbol{\Gamma}$	Initial probability matrix
M	Count of states

f_{ij}	Number of transitions from state i to state j after aggregated
$f_{ij}(t)$	Number of transitions from state i to state j for a period at t
log	Logarithm
$\sum$	Summation or sigma notation
∂	Partial derivative
$\hat{p}_{ij}$	Estimator of p_{ij}
$\forall$	For all
$\propto$	Proportional to
$=$	Equal
$\neq$	Not Equal
$\geqslant$	Greater- Than or equal
$\leqslant$	Less- Than or equal
$>$	Greater- Than
$<$	Less- Than
$\boldsymbol{L}$	Transition count matrix for aggregated matrices
$\boldsymbol{L}(t)$	Transition count matrix for a period at t
$f_i(t-1)$	Sum of row i of transition count matrix for a period at t
$\sim u$	Zero order Markov chain ($\sim u = 0$)
$\sim v$	Zero order Markov chain ($\sim v = 1$)
ln	The natural logarithm
Λ	Likelihood ratio test

C_t^*	Annual contribution in investment over T
γ	The likelihood ratio criterion
χ^2	Chi square test
q	Natural number
lim	Limit of a function
$\boldsymbol{\pi}$	Limiting distribution
∞	Infinity
$\boldsymbol{\vartheta}_{ij}$	The expected number of visits from state i to state j
τ	Expected Return Time
$\sim Z_t$	Discrete random variable for classified of $MIRR$
λ	Benchmark for classified of $MIRR$
$\Delta\omega_{AGL}$	Eigenvector Distance Metric
$\boldsymbol{P}_e$	The exact matrix
$\boldsymbol{P}_u$	The numerical matrix obtained from simulation results
$\|\|\boldsymbol{P}\|\|$	Norm of $\boldsymbol{P}$
$\mathcal{P}$	The mobility matrix
$\mathbb{I}$	Identity matrix
ϕ_i	ith eigenvalue
N	Dimension of matrix
ω	Eigenvalues metric
$\|\ \|$	Absolute value

det	Determinant
$tr(\boldsymbol{P})$	Trace of $\boldsymbol{P}$
z	Set of variables
ω_{Euc}	Euclidian metric
ω_{Man}	Manhattan metric
$\boldsymbol{P}'$	Transpose of a matrix $\boldsymbol{P}$
$\sqrt{}$	Square root
l	Metric type
$\Delta\omega_l$	Different between $\omega_l(\boldsymbol{P}_e)$, $\omega_l(\boldsymbol{P}_u)$
W	Group of Generate random numbers
U	Uniform distribution
n	Sample size
s_x	Probability number which is $0 < s_x < 1$
o_x	Probability number for each state which is $0 < o_x < 1$
Y_i	Set of classification states
G_i	Group of Generate random numbers for state i
$_i$	Numbers of elements of the state i in Y_i
r	Number of states in the transition matrix
Y_{ij}	Set of classification states based on movement form state i to state j
H_j	Number of movements to the state j
α	Critical value

I	First pair of investment periods
II	Second pair of investment periods
III	Third pair of investment periods
IV	Fourth pair of investment periods
i_d	Discount rate
i_r	Rate or return

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ABSTRAK

Baru-baru ini, minat pelabur terhadap pasaran saham dan prestasinya meningkat. Pelaburan dan harga saham berkaitan langsung, menjadikan harga saham lebih tidak stabil. Oleh sebab itu, pelaburan cenderung berisiko tinggi. Penyelidikan dalam nganggaran modal mempertimbangkan penerapan kadar pulangan dalaman (MIRR) yang diubah suai sebagai teknik alternatif kepada kaedah penilaian tradisional seperti nilai kini bersih (NPV) dan kadar pulangan dalaman (IRR) untuk mengatasi batasan tertentu yang berpunca daripada kaedah konvensional ini, terutamanya masalah IRR berganda. Walau bagaimanapun, literatur tentang kaedah MIRR mempunyai beberapa batasan termasuk gagal mengambil kira fungsi terbitan saham seperti pemecahan saham dan penyatuan serta menilai prestasi projek pelaburan dalam jangka panjang menggunakan rantaian Markov berdasarkan strategi MIRR boleh menimbulkan masalah sekiranya ukuran sampel tidak mencukupi. Selanjutnya, penerapan rantaian Markov dalam menilai projek pelaburan dalam jangka panjang berdasarkan harga saham, NPV, dan IRR. Menggabungkan isu-isu ini, tesis ini bertujuan untuk membangunkan pelaburan jangka panjang dari segi menyesuaikan strategi MIRR sambil mempertimbangkan penerbitan saham dan dividen pelaburan semula ke dalam akaun. Selanjutnya, tesis ini melaksanakan simulasi rantaian Markov untuk mendapatkan ukuran sampel yang mencukupi yang diperlukan untuk menilai prestasi projek pelaburan menggunakan model rantaian Markov berdasarkan strategi MIRR. Kaedah yang dicadangkan digambarkan menggunakan data pasaran saham syarikat tersenarai awam di sektor Perkhidmatan Produk dan Perindustrian Malaysia (MIPS) dan dibandingkan dengan kaedah harga saham untuk

kemantapan. Dapatan paling penting diterbi daripada tesis ini adalah penyesuaian strategi MIRR yang berjaya untuk menilai prestasi projek pelaburan ditunjukkan dengan jelas oleh kenaikan harga saham syarikat dari masa ke masa, rangkaian kadar dividen, dan kemurahan syarikat dalam mengeluarkan saham kepada pemegang saham. Tambahan lagi, walaupun harga saham dan strategi MIRR yang dicadangkan mempunyai hasil atau cadangan penilaian yang sama, kaedah MIRR semasa memberi maklumat berharga kepada bakal pelabur dan lembaga pengurusan syarikat. Sebagai kesimpulan, tesis ini memperdalam literatur yang ada dalam hal meningkatkan pengetahuan lembaga syarikat dan bakal pelabur serta rancangan dan keputusan pelaburan masa depan. Walau bagaimanapun, kaedah MIRR yang dicadangkan adalah menuntut pengiraan.

THE PERFORMANCE OF MODIFIED INTERNAL RATE OF RETURN FOR EQUITY INVESTMENT ASSESSMENT: A MARKOV CHAIN APPROACH

ABSTRACT

Recently, investors' interest in the stock market and its performance has arisen. Investment and share prices are directly related, which makes the stock prices more volatile, and thus the investment is more likely to be of high risk. Research in capital budgeting has considered the application of the modified internal rate of return (MIRR) as an alternative technique to the traditional valuation methods such as the net present value (NPV) and the internal rate of return (IRR) to overcome certain limitations raised from these conventional methods, especially the problem of multiple IRR. However, literature on the MIRR method has some limitations including failing to take into account the share issuance function such as share split and consolidation as well as valuing the performance of an investment project in the long-run using the Markov chain based on the MIRR strategy could be problematic in case of insufficient sample size. Furthermore, the application of the Markov chain in valuing an investment project in the long-run was based on stock prices, NPV, and IRR. Combining these issues, this thesis aims to develop a long-term investment in terms of adjusting the MIRR strategy while considering the share issuance and reinvested dividends into account. Furthermore, this thesis implements Markov chain simulations to obtain the sufficient sample size required to assess the performance of an investment project using the Markov chain model based on the MIRR strategy. The proposed methods are illustrated using stock market data of public listed companies in the Malaysian Product Services and Industrial sector (MIPS) and compared to the stock prices method for robustness. The most important finding to emerge from this thesis is the successful adjustments of the

MIRR strategy to assess the performance of an investment project have been clearly reflected by the increase of company's share prices over time, series of dividend rates, and generous of the company in issuing shares to the shareholders. Furthermore, even though both stock prices and the proposed MIRR strategy have the same evaluation results or recommendations, the current MIRR method provides valuable information to potential investors and the company's management board. To conclude, this thesis deepens the existing literature in terms of significantly improving the company's board and potential investors' knowledge and future investment plans and decisions. However, the proposed MIRR method is computationally demanding.

CHAPTER 1

INTRODUCTION

1.1 General Introduction and Background Study

One of the purposes of investing in stock is the ownership of the company invested. The investor's ownership of the company is usually described in terms of the number of shares held. The value of his investment is then evaluated by the product of the share units hold and the current stock price. In general, the fluctuations in stock price over time can be considered as one of the potential indicators in assessing the market performance and thus play a vital role in developing and enhancing the country's economy. Furthermore, investors usually assess listed shares' behavior to improve their knowledge and investment decisions to maximize their investment profit.

On the other hand, the investors' earnings depend; to some extent, on other market variables, such as political instability and economic performance. Thus, investors who have an outstanding knowledge of financial management usually make wise investment decisions. Therefore, investors might use different investment evaluation models to choose their stocks and monitor their stock portfolios' performance. Accordingly, stock valuation is defined as a technique where a company's value can be determined, informing the investors about its profitability restrictions (Besley and Brigham, 2018).

Therefore, investment evaluations have attracted both investors and researchers (Dzung et al., 2017; Erum et al., 2016; Le et al., 2019). Accordingly, the literature on capital budgeting suggests different investment evaluation methods that have been

applied to assess the performance of an investment project and the company's behavior such as the discounted cash flow analysis (DCF), which includes the net present value (NPV), internal rate of return (IRR), and modified internal rate of return (MIRR) evaluation techniques (Bennouna et al., 2010; Brealey et al., 2011; Brigham and Ehrhardt, 2014; Brounen et al., 2004; Graham and Harvey, 2001; Kengatharan, 2016; Kierulff, 2008; Ross et al., 2019).

Evidence from academia suggests that the NPV technique is the most commonly used measure to assess the return on investment because it maximizes equity's market value (Bennouna et al., 2010; Brealey et al., 2011; Brigham and Ehrhardt, 2014; Brounen et al., 2004; Graham and Harvey, 2001; Kengatharan, 2016). Meanwhile, the IRR technique is mostly favored over the NPV technique to assess the attractiveness of an investment project (Bennouna et al., 2010; Brealey et al., 2011; Brigham and Ehrhardt, 2014; Brounen et al., 2004; Harvey, 1995; Kengatharan, 2016). However, investment evaluations of an investment project or a firm based on the NPV and IRR strategies may lead to inconsistent results, especially when evaluating an investment in two disjoint projects and when cash flows changed over time, particularly the non-conventional cash-flow (Harvey, 1995; Kulakov and Kastro, 2017). One main problem of investment evaluation based on the IRR method is that it assumes the reinvestment of the gained positive cash flows at the same rate at which they were created as well as it may produce multiple solutions to one investment project and thus leading to inconsistent results (Brounen et al., 2004; Harvey, 1995; Kierulff, 2008). These issues have attracted various researchers to develop alternative investment evaluation methods to overcome this problem such as the MIRR method, which has become most frequently used in capital budgeting practices (Athanasopoulos, 1978; Balyeat et al.,

2013; Blaset Kastro and Kulakov, 2017; Ivanović et al., 2015; Kulakov and Kastro, 2017; Lin, 1976; Solomon, 1956). The MIRR assumes that the returns obtained from the positive cash flows of an investment project will be reinvested at the external rate of return, which is formally equal to the equity's cost of capital (Balyeat et al., 2013; Ivanović et al., 2015; Kengatharan, 2016; Kierulff, 2008).

On a theoretical basis, however, investors do not consider the share issuance in their investment, which does not affect the wealth of shareholders (Isa et al., 1997; Murray, 1985). When the company practices share issuance such as splitting shares, the investor's capital remains the same even though his ownership increases as of multiplicating share units that might be attributed to the reduction in stock prices after the announcement of a share split given that the non-payment of dividend is distributed in a particular year (Isa et al., 1997; Lakonishok and Lev, 1987; Lamoureux and Poon, 1989). On the other hand, the issuance of bonus share might assist the shareholders in conserving their stocks on the company, and it might provide a sign for higher investment profit in the future whereby the firm's management board may act bonus shares issuance in case they have positive indications about the future profit (Isa et al., 1997; Srividya, 1999).

Over the past decades, there has been a considerable amount of debate regarding the extent to which the past can be used to forecast the future. Markov chain models, developed by Russian scientist Andrey Markov in 1906, have been extensively used to forecast the future (Mettle et al., 2014; Zhang and Zhang, 2009). A Markov chain model is a stochastic model that describes a sequence of potential events in which every event's probability depends entirely on the state accomplished in the previous event

(Asmussen, 2008). In a stochastic analysis, the appeal of the Markov chain model is not new. Many stochastic processes used to model biological, physical, financial, engineering systems are Markovian, which means that it is easy to simulate compared to other models (Anderson and Goodman, 1957; Fama, 1965; Goldfeld, 1973). For example, Anderson and Goodman (1957) estimated the transition probability matrix in a Markov chain model using maximum likelihoods, asymptotic distributions, and test hypotheses on model parameters. Moreover, Fama (1965) discussed random walks theory and provided substantial evidence to support stock prices' stochastic nature. Furthermore, Goldfeld (1973) applied a Markov model to switching regressions to study growth dynamics that rely on an extended period.

The majority of Markov models are based on a sufficient data set, either in terms of sample size or frequency of time, as demonstrated in various studies (Fama, 1965; Mettle et al., 2014; Zhang and Zhang, 2009). However, these models would be difficult to calibrate for data that are characterized by a short frequency of time, which results in an unreliable estimation of the transition probability matrix. Increasing the sample size in a system of transition could help to overcome this shortcoming. Some studies have dealt with small sample sizes, such as Abidin and Jaffar (2014), who used a Geometric Brownian motion to forecast share prices in Bursa Malaysia.

1.2 Problem Statement

Over the past decades, investment evaluations based on the traditional NPV and IRR strategies have been among the most frequently used methods to assess the attractiveness of an investment in modern corporations (Ross et al., 2019). Nonetheless,

NPV and IRR failed to deal effectively with various investment problems such as those where periodic free cash flows are generated between the time of asset purchase and the time of sale, the two measures may rank projects differently in terms of financial attractiveness, and an investment project may have multiple IRRs (Kelleher and MacCormack, 2004; Kierulff, 2008; Sim and Wright, 2017). The MIRR, however, was designed to deal effectively with free cash flows during the purchase and sale of assets and to solve the problem of multiple IRRs for a certain investment project (Ivanović et al., 2015; Kierulff, 2008; Kulakov and Kulakova, 2014; Ross et al., 2019). However, MIRR was not designed to deal with the share issuance function like stock split and consolidation. Therefore, neglecting the share issuance function in valuing a project using DCF analysis could lead to an inconsistent valuation of an investment project.

Moreover, the Markov chain approach has been widely used to forecast the long-run performance of an investment project or equity but most studies relied on the stock prices (Bhuvaneshwari and Ramya, 2014; Mettle et al., 2014; Obasi et al., 2018; Zhang and Zhang, 2009) while others relied on the IRR (Dhavale and Sarkis, 2018; Sim and Wright, 2017). These studies had utilized a sufficiently large sample size. Nevertheless, the Markov chain models were not well documented and applied to assess the performance of an investment project based on the MIRR strategy whereby it may problematic in case of insufficient sample size.

Therefore, this thesis seeks to fill the gaps in the current literature and seeking solutions to overcome the following research problems.

1. The first problem of a particular project's investment valuation of a certain project

is that investors did not consider the issuance functions such as share split or consolidation and bonus share, which are beneficial in determining the shares outstanding to be invested next year. Therefore, it seems that the MIRR investment strategy is not well documented theoretically in the literature to assess the performance of an investment project in the long term.

2. The second problem is related to the sample size considerations to accurately estimate the transition probability matrix that represents the movements of a project from one state to another in the long run through Markov Chain simulations. In other words, the available forecasting methods require a large sample size, which is mostly used stock prices rather than DCF. However, forecasting stock price movements to value a project may result in a loss in data features, which would significantly hurt the accuracy of the results.

3. The third problem pertains to the lack of empirical applications of the investment evaluation by the MIRR strategy taking into account the share issuance function, in the long run, using the Markov chain approach.

Considering the prevalence of these three broad problems and gaps in the literature, the current thesis is motivated to develop three different new techniques to be used together in valuing an investment project in the long-run. These three methods including calculating the value of MIRR after taking into account the reinvested dividends and share issuance functions, assessing long-term investments using the MIRR strategy, and determining the required sample size (i.e., number of companies) to value an investment project using Markov Chain simulations. These new methods will solve the problems of existing DCF analysis strategies.

1.3 Research Objectives

The current thesis is focused on valuing an investment project in the stock market in the long-term based on the MIRR strategy with the following goals:

1. To develop a new and accurate technique to determine the MIRR that is influenced by the movement of stock price timely, the continuation of dividend payouts that can be potentially reinvested, and the impact of share issuance that increase the amount of shareholder's ownership.

2. To develop a new method of estimating the required sample size (i.e., number of companies) to value an investment project using Markov Chain simulations.

3. To evaluate an investment project in terms of assessing companies' performance by the MIRR strategy using Markov Chain for the first and second order.

1.4 Scope of the Study

This thesis focuses on valuing an investment project in the long-term in terms of adjusting the MIRR strategy influenced by the movement of stock price timely, the continuation of dividend payouts that can be potentially reinvested, and the impact of share issuance that increase the amount of shareholder's ownership. Besides, this thesis takes the sample size considerations into account. The current analysis is performed on several publically listed companies operating in the Malaysian Industrial Products and Services sector (MIPS).

1.5 Significance of the Study

In capital budgeting practices, it is imperative to provide accurate stock valuation strategies for researchers, investors, and the company's management board. The traditional valuation methods generally determined the potential future shares to be acquired in the future. Nevertheless, these methods did not consider the growth in shares owned by investors or companies as returns to a firm from financial and profitability ratios, which is not considered as an indicator of the investment returns from the stockholders' point of view (Brounen et al., 2004; Harvey, 1995; Kierulff, 2008). For example, if the company's return on investment for a particular year is 0.2, it does not tell us that our share capital invested in that company grows up to 20% for the following year. Subsequently, these traditional methods may fail to provide investors with the appropriate information concerning an investment project and thus deteriorate their decisions to investment potentials. Besides, the current methods employed Markov chain models to forecast the long-run behavior of shares and their returns based on sufficiently large data only. This thesis intends to address these problems by employing a novel MIRR methodology to assess the long-run performance of an investment project or a firm that is influenced by the movement of stock price timely, the continuation of dividend payouts that can be potentially reinvested, and the impact of share issuance that increase the amount of shareholder's ownership and thus improve investors' knowledge and decisions. Furthermore, this thesis employed a Markov chain simulation method to determine the required sample size and thus be able to obtain more efficient investment valuation results in the long term. This thesis adds to the current literature on investment evaluation methods by integrating the proposed MIRR strategy with existing evaluation methods. Accordingly, an adjustment to the MIRR strategy in addition

to Markov chain simulations are developed. The experimental results of this thesis show evidence of significant improvement to the MIRR strategy to assess the performance of an investment project or a company in the long run as compared to those based on stock prices in terms of aiding potential investors' and the company's management board with more helpful information based on the three different simulation scenarios of long-term, medium-term, and short-term investment periods. Finally, the current thesis findings contribute to the existing literature on stock valuation in terms of assessing the attractiveness of an investment in the stock market.

1.6 Thesis Organization

The current thesis is organized as follows. Chapter 2 presents the conceptual framework of stock valuation and financial data and a review of the literature on the stock investment valuation methods. Chapter 3 presents the proposed method pertained to calculating the modified internal rate of return (MIRR) of an investment project in the long-term. Maximum likelihood, transition matrix, transition probability matrix, stationary tests, limiting distribution, expected return time, expected number of visits, and higher-order Markov chain models are also explained in Chapter 3. Chapter 4 presents a Markov chain simulation strategy to determine the required sample size to perform stock investment valuation in the long-term. Chapter 5 presents an application to real time stock market data of public listed companies in the Malaysian Industrial Product and Services sector and discusses the obtained results. The last chapter concludes the thesis by summarizing the main objectives and findings, suggestions for further work, and the contribution of the study.

CHAPTER 2

CONCEPTUAL FRAMEWORK AND LITERATURE REVIEW

2.1 Introduction

This chapter is devoted to providing the conceptual framework and literature review of investment evaluation methods and contains seven sections. The second section offers a brief definition of investment and investors. The third section defines the annuity. The fourth section pertains to the annual reports issued by companies and how some of their components are utilized. In particular, the financial statement and analysis of shareholding are presented. The fifth section describes the share issuance function and its influence on the investment. The sixth section presents the stock valuation strategies including but not limited to stock prices, financial ratios, and discount cash flow (DCF) analysis. Besides, this section provides a review of empirical literature concerning investment evaluation. The last section summarizes the chapter.

2.2 Definition of Investment

Investment is defined as the act of placing money either to begin or expand a project or to buy assets for which that money is utilized to generate or increase income over time (Luenberger, 1998). It can be typically referred to as any procedure performed to generate income in the future. From a finance point of view, an investment may include the purchase of stocks, assets, or real estate property among numerous others. However, this mechanism may be associated with some degree of risk (Chandra, 2017; Luenberger, 2009).

2.3 Annuity

An annuity is defined as a series of fixed identical cash flows received at a constant uniform interval and terminating later a fixed number of payments at a certain time (Berk and DeMarzo, 2017; Ross et al., 2019). Figure 2.1 illustrates the cash flows of an annuity in a given number of fixed payments in a specific number of years T.

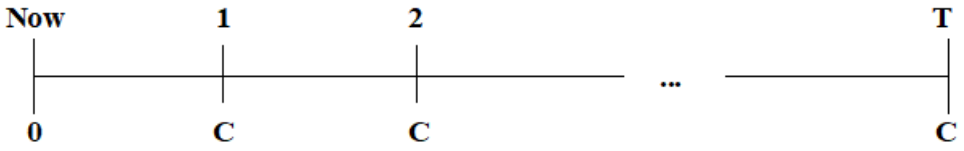

Figure 2.1: Cash flows of annuity in a specific time T.

An annuity is acted either as a lump sum or drip-feed investment strategies. The investment strategy of lump sum entails making one large lump sum single investment at the beginning of an investment project and holding this payment for a certain number of years. However, the drip-feed investment strategy encompasses depositing small systematic monthly installments over a specific number of years.

The drip-feed strategy is preferred when too little information is known about an investment project such as the project is too new or when the investor is uncertain about the risk factors. That is, the drip-feed is a good route for an investor if he/she plans to begin and finance an investment project and there is very little information about the uncertainty concerning its future. Therefore, funding a project in stages rather than all at once or lump sum diminishes the risk factors. Besides, stock markets are very volatile and thus funding little amounts at different times in terms of drip-feed strategy

rather than lump-sum payment would be a better choice. However, an investor will lose the opportunity to benefit from the rise of stock returns at the beginning of the project (Lemaire et al., 2010; Luo, 2017).

On the other hand, the lump sum strategy would be a better choice if an investor would like to have or expect rapid stock returns and he/she secure the startup of an investment project to do well. The major benefit of the investor to acquire from this strategy is that he will have a great benefit from any potential increase in stock returns at the beginning period of investment since he uses his total amounts of the fund. However, the same procedure will apply for any potential decline in the stock market and thus he will lose the whole amount of money invested. Therefore, the time and risk factors should be taken into consideration when choosing either a lump sum or a drip-feed investment strategy, especially in the long-run (Lemaire et al., 2010; Luo, 2017).

2.4 Annual Reports

The annual report is a comprehensive report for which the firm announced each year whereby it shows the company's activities throughout the previous year. Annual reports aim to provide shareholders and other interested persons with information about the financial performance and the company's activities and thus can be considered gray literature. Most jurisdictions require companies to prepare and disclose their annual reports, and many require that the annual report be filed with the company registry. The companies listed in the stock exchange also have to report at frequent intervals (depending on the rules of the respective exchange) (Fraser and Aileen, 2016;

Tracy and Tracy, 2020). Typically, a financial report consists of several parts that are mentioned below,

2.4.1 Financial Statements

Financial statements are formal written accountants reports issued by a company periodically, which usually convey information regarding the previous performance of the financial and business activities of a company. Financial statements play a vital role for financial analysts, investors, and creditors to gauge information about a specific company concerning its financial behavior and earning potentials. They are also beneficial for the company's management board as a valuable source of information to help them make accurate and appropriate financial decisions (Berk and DeMarzo, 2017).

The main aim of a company to disclose its financial statements is to help investors improving their knowledge about the company's past, present, and future performance, which are used in financial analysis. Generally, all public listed companies have to document their financial statements by law to the related authorities. Besides, they have to document them to their shareholders in the annual financial reports (Berk and DeMarzo, 2017; Easton et al., 2018; Penman, 2013).

In general, financial statements include three main financial reports including the balance sheet, income statement, cash flows statement. Besides some other related reports such as the statement of shareholders' equity (Berk and DeMarzo, 2017; Easton et al., 2018; Penman, 2013; Ross et al., 2019). Each report pertains to specific financial information accordingly, which will be briefly discussed below.

2.4.1(a) Balance Sheet

Figure 2.2 shows the balance sheet that is a financial statement report that offers lists of a company's assets, liabilities, and shareholders' equity as well as providing a snapshot of the financial position of a firm at any given point of time (Fraser and Aileen, 2016) . At the top of the balance sheet, there is a date that shows the time at which the snapshot was taken, which is formally the end of the financial year (Penman, 2013; Berk and DeMarzo, 2017; Ross et al., 2019).

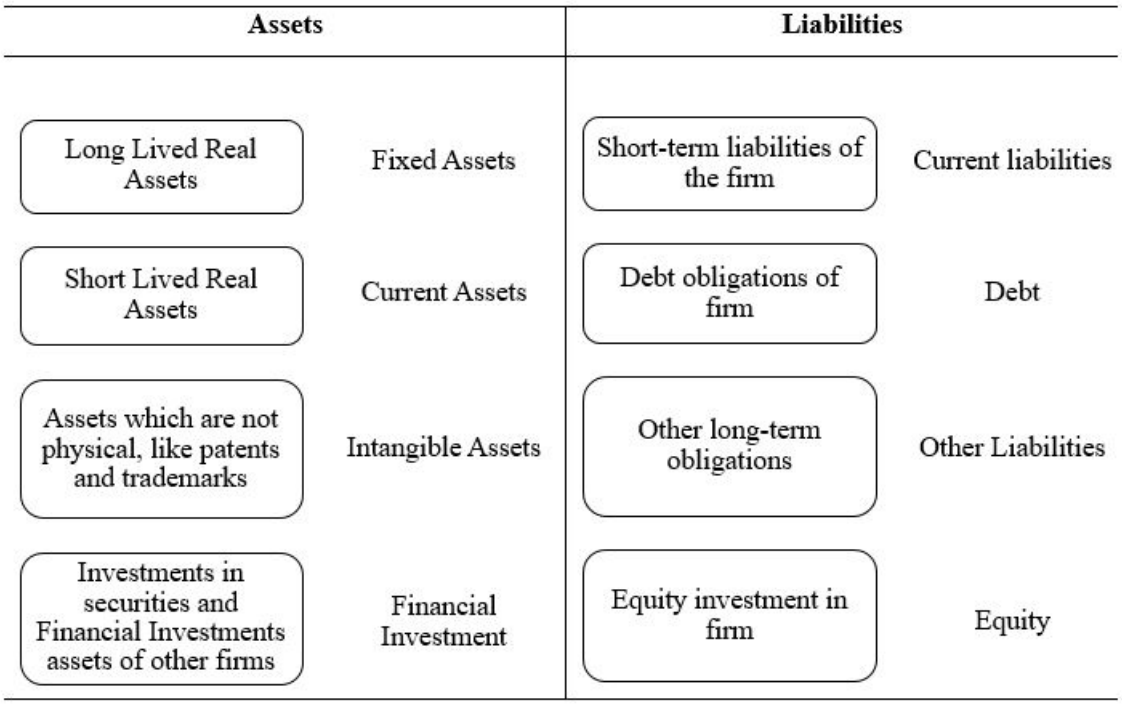

Figure 2.2: The Balance Sheet.

The general formula for the balance sheet is written as:

$$Assets = Liabilities + Shareholders' \ equity \tag{2.1}$$

where, assets present the firm's cash and cash equivalent. The cash equivalent includes

inventory, property, equipment, plant, and any related investments made by a firm that are projected to produce payoffs. Two broad asset types can be utilized including current assets and long-term assets. The current assets are the assets or cash that can be transformed into cash during one fiscal year. This may comprise of marketable assets such as government debt, accounts receivable, inventories like raw materials, and other current assets like prepaid expenses, which includes rent and insurance (Berk and DeMarzo, 2017; Easton et al., 2018; Penman, 2013; Ross et al., 2019). On the other hand, the long-term assets are those related to those generating benefits for more than one fiscal year such as real estate and machines (Berk and DeMarzo, 2017; Easton et al., 2018; Penman, 2013; Ross et al., 2019).

Liabilities are claims to payments by claimants not to owners. Liabilities include current and long-term liabilities. The current liability includes the short-term liabilities that can be claimed within one year such as accounts payable like services or supplier purchased, short-term debt, and accrual items including taxes and wages. On the other hand, the long-term liabilities are those that are paid or claimed for more than a year such as the loans obtained to raise an investment fund (Berk and DeMarzo, 2017; Easton et al., 2018; Penman, 2013; Ross et al., 2019).

Stockholders' equity is a claim made by the landlords. It can be obtained by calculating the difference between the total assets and total liabilities. It is also called the equity's book value. From the balance sheet, investors and financial analysts can obtain some useful ratios to perform financial analysis and examine the performance of a firm such as the Market to Book Value ratio (Berk and DeMarzo, 2017; Easton et al., 2018; Penman, 2013).

2.4.1(b) Income Statement

An income statement is a financial report that represents the company's revenues and expenses during a certain period (e.g., quarter, year)is as shown in Figure 2.3 (Fraser and Aileen, 2016). In other words, it measures the firm's performance during a certain period like one year. The profitability of a company over this period is measured by the net income or earnings, which is usually located at the last line of the income statement (Berk and DeMarzo, 2017; Easton et al., 2018; Penman, 2013; Ross et al., 2019). The formula of the income statement can be written as:

$$\text{Re}\,venues - Expenses = Net\ \ income \tag{2.2}$$

Revenues can be either operating or non-operating revenues. The operating revenues are cash earned from the firm's central activities while the non-operating revenue is the cash received from the financial activities not related to the central company's activity such as interests acquired from money in the bank. On the other hand, expenses can be either primary or secondary expenses. The primary expenses are imposed within the process of gaining revenue from the primary core activity of a firm including the cost of goods sold, selling, and typical expenses such as salaries and utility spendings like transportation, electricity, and water bills. Meanwhile, the secondary expenses include losses that emerged from selling assets and interests imposed on bank loans (Easton et al., 2018; Penman, 2013; Ross et al., 2019). Therefore, providing time-series records of income statements would be more appreciated to forecast the behavior of a certain firm and examine if the changes occurred are beneficial or not, which might help improve investors' knowledge regarding the stock prices of such a firm.

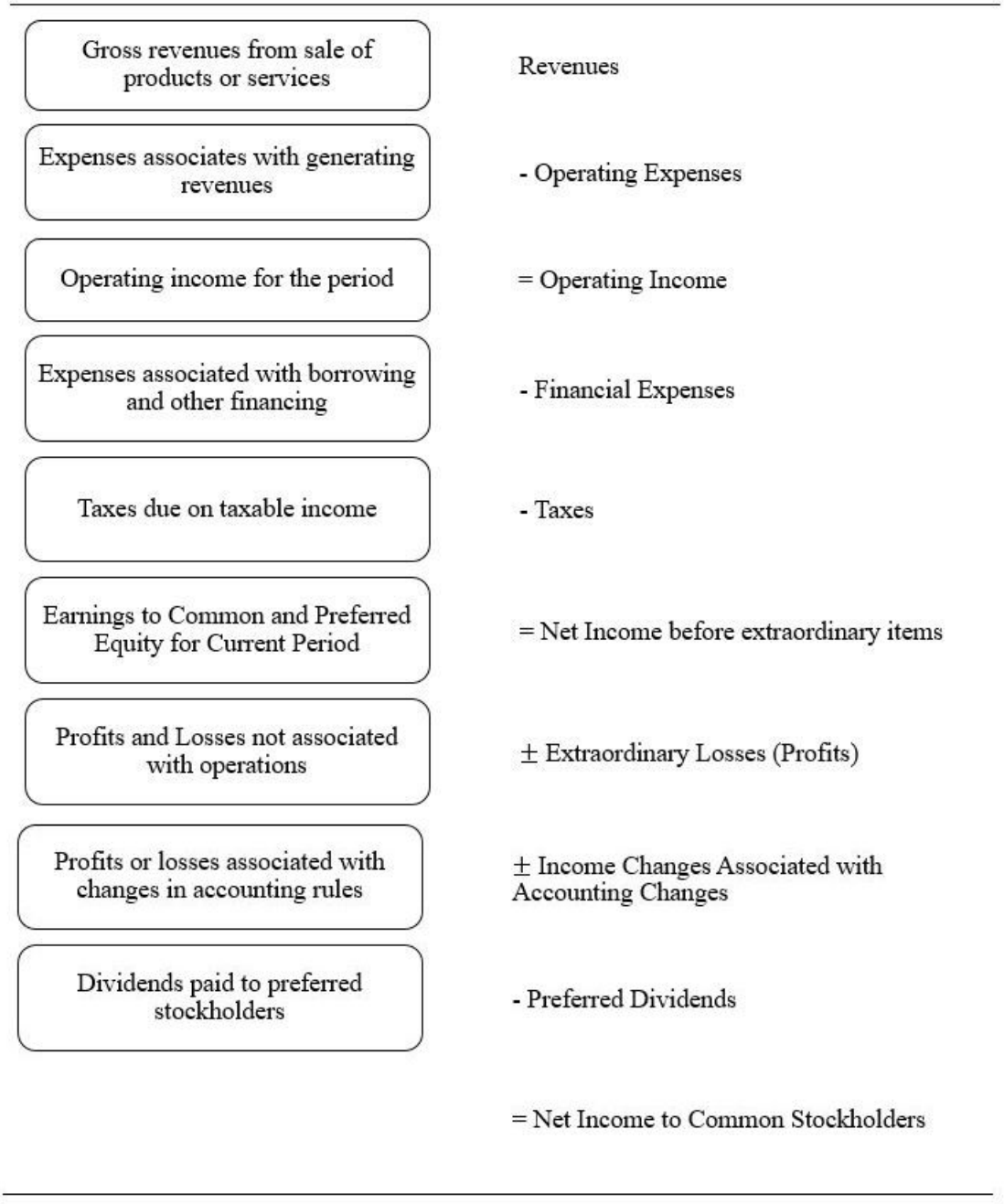

Figure 2.3: Income statement.

2.4.1(c) Cash Flow Statement

Figure 2.4 shows the cash flows statement is a financial statement report that complements the balance sheet and income statement (Fraser and Aileen, 2016). It provides information on how much cash is generated by a company and how this cash is allocated over a certain period to pay its debts and to finance its operating expenses and investments. In other words, the cash flows statement provides investors with information on how the firm is operating in the market, the source of its money obtained from, and how its money was spent. Therefore, financial managers or potential investors aimed to value such a firm would find the information provided from the statement of cash flows to have the furthermost vital information of the four variant types of financial statements (Berk and DeMarzo, 2017; Easton et al., 2018; Penman, 2013; Ross et al., 2019).

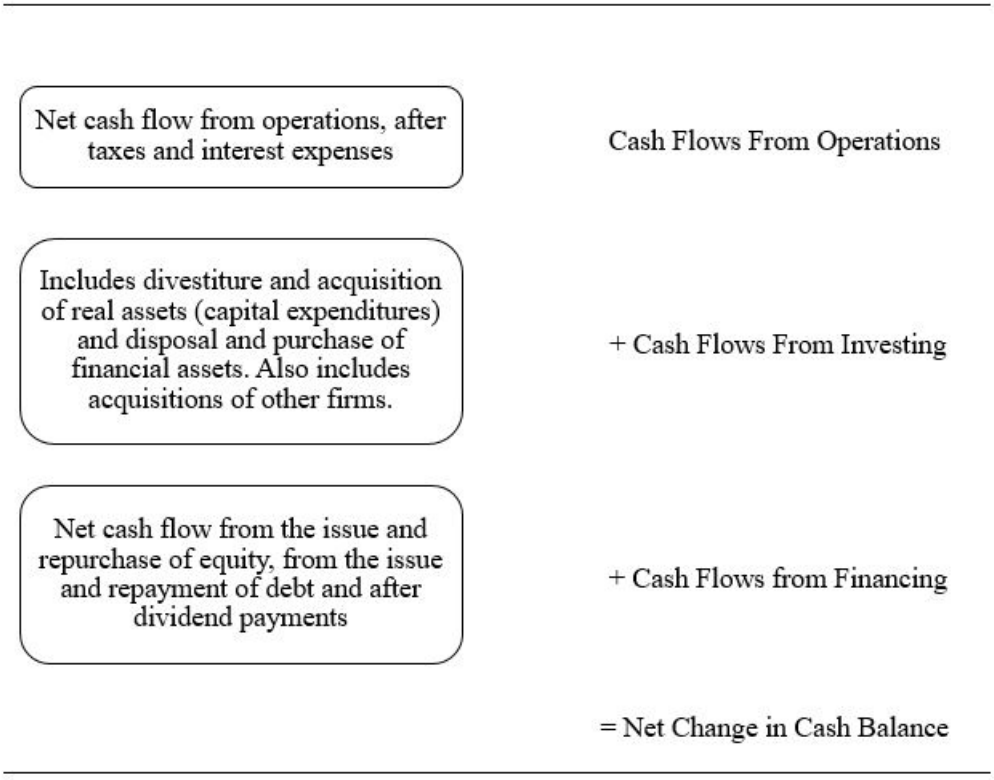

Figure 2.4: Statement of Cash Flows.

The statement of cash flows comprises three different sections including operating activities, investment activities, and finance activities. The operating activities firstly utilize the net income obtained from the income statement and then adjusting the net income to include all non-cash operating activities. This should include accounts receivable, inventory, depreciation, and accounts payable. These transactions cover salaries, income-tax and interest payments, rental allowance, and cash received from selling any of the company's products or services as well (Berk and DeMarzo, 2017).

The investment activities enumerate the cash that is funded for investment, which includes buying equipment, plants, assets, and new property, and are considered as capital expenditures for which these expenditures did not appear in the income statement. Finally, the finance activities section presents any cash acquired by the firm from selling its stock or cash spent on repurchasing its stock or buying new stock. Financing activities include equity and debt issuances, stock buying or buybacks, lends, dividends paid to stockholders, and debt repayments (Berk and DeMarzo, 2017; Easton et al., 2018; Penman, 2013).

After summing these cash flows, can be illustrate either the rise or reduction in the company's cash, which is usually presented at the bottom line of the statement of cash flows (Easton et al., 2018; Penman, 2013).

$$\begin{aligned} Change\ in\ cash = {} & Cash\ from\ operations + Cash\ from\ investment \\ & + Cash\ from\ financing \end{aligned} \tag{2.3}$$

2.4.1(d) The Statement of Shareholders' Equity

The statement of shareholders' equity decomposes the equity of shareholders reported in the balance sheet into shares that were obtained from shares issuance and reserved earnings (Berk and DeMarzo, 2017). The change in shareholders' equity can be obtained using the following formula:

$$\begin{aligned} Change\ in\ Stockholders'\ Equity &= Retained\ Earnings + Net\ sales\ of\ Stock \\ &= Net\ Income - Dividends + Sales\ of\ Stock \\ &\quad - Repurchases\ of\ Stock \end{aligned} \tag{2.4}$$

This statement illustrates how shares of equity are being changed at the beginning and end of a certain period with equity flows over that period (Easton et al., 2018; Penman, 2013).

2.4.2 Analysis of Shareholdings

The analysis of shareholding is a part of a publically listed company's annual report that illustrates the distribution schedule of shareholders. Financial analysts typically use this part to calculate the number of issued shares outstanding as well as get informed about the number of shareholders (either individual or groups) owning shares in their firm. Moreover, a shareholdings analysis provides information on how investors buy stocks. Therefore, this analysis can aid in demonstrating that there is no collusion between investors and public listed companies in the stock market. Figure 2.5 shows the analysis of shareholdings for a firm.

Size of Shareholdings	No. of Shareholders	%	No. of Shares	%
1 - 99	220	7.03	6,497	0.00
100 - 1,000	242	7.73	79,926	0.01
1,001 - 10,000	1,072	34.24	6,014,950	1.18
10,001 - 100,000	1,302	41.58	47,563,006	9.30
100,001 - 25,583,258 (*)	289	9.23	216,496,475	42.31
25,583,259 and above (**)	6	0.19	241,504,343	47.20
TOTAL	**3,131**	**100.00**	**511,665,197**	**100.00**

Figure 2.5: The Shareholdings Analysis.

2.5 Share Issuance

The share issuance is the procedure of generating either newly issued shares or dividing the existing shares held by the company. The issued share is an act of law for the number of allotted shares of the company and then resold to the shareholders (Cho, 2017; Shim and Siegel, 1999). Shares issuance is conducted once during the financial year. Firms usually utilize corporate financing policies to acquire external finances or funds to start new investments, pay dividends, and maintain the capital structure. Besides, to increase the liquidity of their stock market and issue awards to the equity portfolio. Specifically, shares issuance is an investment-related strategy for which companies that have higher opportunities for growth require external funding to undertake them (Gyimah, 2016).

The share's issuance may have several effects on the stock prices, the number of outstanding shares, and market efficiency during the investment year. These effects may cause abnormal returns, which may happen at random and positively affect stock prices (Alex, 2017; Bhuvaneshwari and Ramya, 2014; Dhar and Chhaochharia, 2008; Ghatak, 2011; Isa et al., 1997; Mehndiratta and Gupta, 2010; Ray, 2011). On a theo-

retical basis, however, investors do not consider the share issuance in their investment, which does not affect the wealth of shareholders (Isa et al., 1997; Murray, 1985).

Different types of shares issuance can be employed by the company's management board once they elect to do so. These types will be discussed in the following subsections.

2.5.1 Share Split and Consolidation Share

Generally, all public listed companies in the stock market have a certain number of outstanding shares. A share split is a decision made by a firms' panel of managers to grow the number of outstanding shares through issuing extra shares to existing shareholders. In other words, a share split is an action taken by the company's managers by dividing the current shares into several shares to raise the stock's liquidity (Brooks et al., 2003; Chen and Kim, 2011; Ross et al., 2019). Chen and Kim (2011) suggested that the company undertakes a share split to have a better trading range of share price bring and enhance its liquidity position.

This procedure would lead to an increase in the number of shares held by shareholders, which are subject to adjustment under a specific stock split ratio. For example, if the stock split ratio is 2 for 1, this means that the shareholders would have 2 extra shares for every existing share. That is, the number of outstanding shares will be doubled. However, the price per share will be declined by one-half but the firm's total value will remain the same. Therefore, this would make the shares more accessible for a large number of potential shareholders. This procedure is sometimes called the forward stock split (Pierre et al., 2017; Ross et al., 2019). Accordingly, the number

of potential investors will increase by the low share price because more investors can have the funds to purchase the specific share, and therefore the number of possible rich investors will either remain relatively constant or rise also and thus upwards the liquidity (Brooks et al., 2003).

When the company practices share issuance such as splitting shares, the investor's capital remains the same even though his ownership increases as of multiplication of share units. This is because of the share split declines stock prices provided the non-payment of dividend distributed in a particular year (Gray et al., 2003; Isa et al., 1997; Lakonishok and Lev, 1987; Lamoureux and Poon, 1989).

Another form of share split is a reverse split or consolidation in which the company's board divides the current shares into dividers rather than multiplying them using a specific ratio of share split and increases the price per share. For example, if the stock split ratio is 1 for 2, this means that the number of shares held by shareholders will be decreased by 50%. In other words, shareholders will lose one share for every two existing shares. That is, the number of outstanding shares will be shortened by half. However, the price per share will be increased by 2 but the firm's total value will remain the same. The firm's board usually takes this action to discard the shareholders that have a small number of shares relative to a certain number of shares of that firm.

Porteus (2010) adopted an event study to examine the dynamics of stock splits and the liquidity of 15 public-listed companies in Scotland. The event window of 61 days was distributed as 30 pre-split date of the announcement, the day of the announcement, and 30 days post-split date of the announcement. The study indicated that stock splits

the demand for securities, which had increased share prices.

A study by Bhuvaneshwari and Ramya (2014) examined the influence of stock split on stock prices in the Indian stock market for CNX companies over the period from January 2006 to December 2013 surrounds 60 days after the share split announcement. Abnormal stock returns were identified over the study period and tested using t-tests to examine their significance. They found that the announcement of share split had positively affected share prices near the ex-days of the announcement as well as lead to further abnormal returns, which are worth to forecasting the future returns and efficiency of the stock market. These results were similar to the findings of Gupta and Kumar (2007).

However, Sivashanmugam et al. (2018) examined the impact of stock split on stock returns for a sample of 49 companies operating under the Indian manufacturing sector over the period from January 2014 to December 2016. The study calculated the abnormal stock returns over 12 days before the share split announcement and 12 days after the announcement. They found that the average abnormal stock returns were negatively affected the day of the stock split announcement. Meanwhile, the average abnormal returns were neither positive nor negative before and after the stock splits announcements. In other words, the share splits do not affect the average abnormal returns and therefore no effect on the performance of the share prices. These results contradicted the findings of Gupta and Kumar (2007) and Bhuvaneshwari and Ramya (2014).

Another study by Muinamia (2015) has investigated the effect of share splits on

the stock returns of some public-listed companies operating at the Nairobi securities exchange during the period 2004 to 2014. The study utilized the design of an event study where the event window involved 61 days. The study calculated the abnormal stock returns over 30 days before the share split announcement, 30 days after the announcement, and one day at the announcement date. The study indicated that stock splits had a positive effect on stock returns and indicated that four firms entertain positive reactions to stock splits during the event period. The study highly recommends the use of a stock split in the Kenyan stock market board by firms' directors to increase their share returns.

2.5.2 Bonus Share

Under the issuance function, the bonus share is defined as the process of increasing the number of outstanding shares by offering free extra shares to the shareholders in which their wealth remains the same (Ross et al., 2016; Thakkar et al., 2019). Moreover, the bonus shares issuance will not cost the company (Pierre et al., 2017). Accordingly, the dividends can be distributed in the form of new shares issued for shareholders. This procedure aims to adjust share prices lower and to increase the liquidity of shares. In particular, no actual value creation for shareholders. Bonus share will be adjusted according to a specific bonus issuance ratio on the ex-date. For example, if the company's board declared a ratio of 1 for 2 bonus share issuance, this means that shareholders will have one new extra share for every two existing shares held by the shareholders (Ross et al., 2019)

The results of various studies indicated that bonus shares will affect share prices,