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VALUATION OF TECHNOLOGY-BASED STARTUP ENTERPRISES USING DISCOUNTED CASH FLOW AND REAL OPTION METHODS

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Abstract

The phenomenon of the emergence of startup firms in Indonesia is often related to the Internet's fast expansion. The increasing number of internet users is fueling the development of new enterprises. There is a correlation between the rapid growth of startups in Indonesia and the "bubble.com" phenomenon that occurred in Silicon Valley between 1999 and 2000. During this time, internet-based firms began to develop. The surge in internet company assets at this time was caused by the valuation of shares, which was not based on the valuation of assets in general. Recently, the stock prices of startup companies have started to fall, and it is considered the same as the "bubble.com" phenomenon. Another indication is that there was a mass layoff

of the company's employees; this condition also happened in Silicon Valley during the era of the fall of jasa.com. In this regard, it is necessary to carry out an intrinsic valuation of startup stocks empirically and in accordance with applicable valuation standards to see the condition of these companies as a whole. The population in this study is startup companies that have conducted an initial public offering on the Indonesia Stock Exchange, while the samples taken are 12 startup companies in the technology sector. The valuation methods used in this study are the discounted cash flow (DCF) and real option (RO) methods. The results of the assessment using the two methods are then reconciled to obtain the intrinsic value of startup companies in the technology sector. According to the results of this investigation, twelve technological startup firms are facing overvaluation. This is due to several factors, including external and internal situations.

Keywords: Tech Startup, Discounted Cash Flow, Real Option, Value Reconciliation, IDX

INTRODUCTION

A startup enterprise is a new and emerging firm with a novel concept that is distinct from SMEs. Startup enterprises are often digital businesses. The term "startup" has become linked with technology, the internet, and the online. According to Witjara (2019), the key component of startups is new ideas; hence, they are not restricted by time. As long as the firm being operated is in a new category, it may still be regarded as a startup; thus, the category can be one to five years old.

The term "startup" is growing in popularity and is often associated with Bubble.com. The internet boomed during the 1990s and 2000s in Silicon Valley. During this time, the www domain was registered. This period is also referred to as the "New Economy Era" due to the emergence of ".com" companies. According to Thiel (2014), internet companies went public during the period of the New Economy, and the value of their shares soared as a result of investors' optimistic expectations for the New Economy. Investors overvalue Internet firms because of competition and speculation. According to Gama et al. (2017), a "bubble" is a type of economic cycle that is characterized by inflated asset prices. This is due to the fact that people have irrational expectations regarding the future.

Valuations that do not adhere to asset valuation standards or market euphoria, which drives market participants to buy assets at inflated prices, may lead to soaring asset prices. Numerous investors heed the counsel of their peers or financial experts. When instructed by a financial expert, investors acquire massive quantities of popular stocks. These actions may result in increased price. Stock prices differ from their genuine value over time as a result of

collective action and excessive optimism (Damodaran, 2014). Bubbles complicate valuation because asset or stock prices generally vary from their fundamental value.

Startups must address social issues in a more efficient, timely, and cost-effective manner. Some entrepreneurs use unique ideas to disrupt businesses (Golomb, 2017). A startup is a firm that is meant to develop quickly, and in Indonesia, startups are often connected with technology. Smartphone usage in Indonesia is being driven by an increase in active internet users. The startup environment in Indonesia is driven by smartphone usage. The startup industry in Indonesia is quickly expanding. Table 1 indicates that as of June 2021, Indonesia is ranked fifth in the world among 182 other nations in terms of the number of startup enterprises, with a total of 2,332. Indonesia has the largest number of startups in Asia, and this trend is expected to continue.

Table 1. Ten Countries with the Highest Startup Enterprises

Ranking	Country	Number of Startups
1	USA	70.836
2	India	12.682
3	English	6.172
4	Canada	3.236
5	Indonesia	2.332
6	German	2.292
7	French	2.222
8	French	1.562
9	Spanish	1.399
10	Brazil	1.164

Source:http://www.startupranking.com

The valuation factor, or business worth, is the most intriguing part of startups. There is a phenomenon in which the growth of startup firms corresponds to the constant increase in internet users, causing investors to place a high value on startup companies (Djaja, 2019). When making an investment, investors should anticipate the investment's value to rise or at least equal the value of compensation for the risk taken. The time value of the money must be weighed against the investment's risk.

According to Damodaran (2018), the challenges in assessing the value of startup firms include a lack of historical data on similar companies. With insufficient prior data, beginning businesses fail or fail to grow due to low sales and massive operating losses. Second, many startup firms are supported by the founders' own resources; networking capabilities also impact investment selections. Given the high risk of startup failure, the startup firm's evaluation cannot be compared to comparable stable enterprises. Another issue caused by a lack of data

gathering is the inability to assess the appropriateness of evaluation findings throughout various time periods and in the past. These limits and challenges necessitate the inclusion of similar information about firms in the assessment. It is customary to utilize risk indices, investment volumes,

In startup firm valuation research, many valuation approaches have been utilized, including Widhiantari et al.'s (2020) use of the Dave Berkus method, Tiwari et al.'s (2019) use of the comparable transaction (gross merchandise value) method , and Apriyanthi et al.'s (2022) use of the scorecard method. Financial aspects such as the firm's balance sheet, profit and loss, and cash flow, as well as qualitative criteria such as economic, industry, and firm performance, have not been included in this study's valuation methodology. According to Prayuda et al. (2021), assessing firm performance without using the general technique may result in information asymmetry in start-ups. Comparable transaction value, for example,

According to Kepi and SPI (2018), while performing an evaluation, standards or norms must be implemented in line with existing laws and regulations. There are three main methods for valuing firms: the market approach, the asset approach, and the revenue approach. According to Djaja (2019), in the startup instance, the asset strategy is meaningless; however, the income approach (the discounted cash flow technique) and the market approach may still be employed, although revisions to the calculations are required. However, it is difficult to discover similar firms or transactions to utilize as comparisons in the market approach in the case of enterprise startups. Furthermore, according to Kepi and SPI (2018), the option pricing model (Real Option) may be utilized to evaluate a market strategy for firms that have launched an initial public offering. According to Gobel (2016), the hybrid model of the Real Option technique and the Discounted Cash Flow method is the best way to use in assessing biotechnology startup firms based on the amount of complexity and valuation principles. In a case study about new secure mail providers, Damodaran (2009) said that using both discounted cash flow and real option methods will lead to a higher valuation of the firm.

The phenomenon experienced by startup companies in Indonesia has recently been considered the same as the buble.com phenomenon. One of them was the mass termination of employment for startup firm employees; this condition was also witnessed in Silicon Valley during the era of the dot-com firm's demise. The valuation of startup companies, especially those based on technology, which is too high due to increased use of the internet and technology, is predicted to experience a significant decrease according to their intrinsic value. In this regard, it is necessary to evaluate the shares of technology-based startup companies empirically to see the condition of these companies as a whole.

It stimulates academics to research technology-based startups listed on the Indonesia Stock Exchange based on the current trend of startup enterprises in Indonesia and the importance of assessing value using several techniques. To establish if the stock prices of Indonesian tech startups represent their actual value, empirical research using appropriate valuation criteria is necessary. Based on the circumstances, the focus of this research is:

RQ1: What is the stock value of technology-based startup companies if the valuation is done using the discounted cash flow (DCF) method?

RQ2: How much is the stock value of a technology-based startup company if the valuation is done using the real option (RO) method?

RQ3: What is the intrinsic value of shares of technology-based startup companies based on value reconciliation? Is it overvalued or undervalued?

RQ4: What are the factors that cause overvalued or undervalued stock prices for technology-based startups in Indonesia?

The aims of this research are: using the discounted cash flow (DCF) and real option (RO) methods to assess the stock of a technology-based startup company; determining the intrinsic value of shares by value reconciliation between the DCF and RO methods; and analyzing the causes of overvalued or undervalued shares of technology-based startup companies.

LITERATURE REVIEW

Startups

The term "startup" refers to a firm or organization that has not been in operation for an extended period of time. The majority of these businesses are in the research and development stages of determining their target market. Positively, "startup" refers to a collection of individuals who believe in a future-building strategy. Innovative concepts and quickness are the primary assets of new ventures (Thiel, 2014). Startups rely on better, quicker, and less expensive solutions to current challenges. Some companies generate wholly novel concepts that alter the way we see an issue or the market as a whole. Since before firms existed, the desire to do something unusual and create something that did not previously exist has prompted pioneers to start new enterprises. This action may be more prevalent today' s highly fruitful startup environment than at any earlier time. (Golomb, 2017). This idea is false, since all startup firms employ information technology to assist their firm operations. According to Ries (2011), a digital startup is a collection of people that produce and sell new goods or services in an unpredictable market environment in search of the optimal business model. As a result, digital startups faced a very uncertain market situation.

Brikman (2015) defines a digital startup as a group of people who form a firm as a startup that produces technology-related goods. By employing technology in the digital world, entrepreneurs must be prepared to join a free market that reaches all customers and increases their market share via significant market growth. Therefore, it is quite rare for startups to disrupt large-scale technologies based on digital models that can be accessible regardless of location or distance. This is the reason for the massive growth of target customers at the beginning of its introduction.

The value of the company

Value is not a fact since it is a subjective assessment of the economic benefits of asset ownership or the most likely price paid for an item in exchange (Kepi and SPI, 2018). Value and the economic benefits of asset ownership have a reasonably close connection with a monetary price, the amount paid for an asset. The ability to trade for other goods or services depending on individual needs or pursuits Value is the advantages, uses, and utilities of owning items, services, or other assets, both measurable and unquantifiable in monetary terms (Djaja, 2017). Investment opportunities have a significant impact on the value of a firm, as determined by stock market value indicators. The availability of investment opportunities may provide a positive message about the company's future growth, therefore raising its value.

Intrinsic Value

In discounted cash flow analysis, the intrinsic value of an asset may be expressed as the present value of predicted cash flows, which are then discounted to account for the time and money value and cash risk (Damodaran, 2018). According to Pratt (2008), an analyst who has done a fundamental review of a firm's assets, profits, and other criteria often considers the stock's intrinsic value to be its fair price. Investors see intrinsic value as having real and genuine worth. When additional investors reach the same conclusion, this value will be utilized as the market value. In the financial literature, many methods for calculating intrinsic value are based on expectations and discounted cash flows. Analysts often assess the intrinsic value of a security based on fundamental elements and compare it to the asset'

According to Kepi and SPI (2018), intrinsic value and fair value cannot be separated since the behaviors of buyers and sellers based on their unique perceptions of intrinsic value eventually lead to market value and to continual and dynamic changes in market value over time. The statutory value criterion is established at fair value, or even fair market value; therefore, an analyst must pay attention to the appropriate criteria when a relevant legal situation occurs.

Fair value

In relevant accounting literature, "fair value" is defined for certain accounting purposes. In business valuation, it is frequently a legally recognized value criterion that applies to a specific transaction (Pratt, 2008). (Pratt, 2008). In the event of valuation rights or shareholder rights based on opposing perspectives, the statutory criterion of value that applies is fair value. Wilestari and Wilestari (2019) found that fair value under PSAK 68 or IFRS 13 is the amount that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants on the measurement date. PSAK (Statement of Financial Accounting Standards), which is a framework for preparing accounting financial reports and contains regulations regarding the recording, preparation and treatment.

Top-Down Approach

In the top-down method, estimation starts with an estimate of the total market for a product or service, followed by the derivation of the remaining figures from the top base (Damodaran, 2018). In the top-down method, issuers are examined in order of their potential, from the highest to the lowest.

Macroeconomic Analysis

In macroeconomic analysis, it is essential to consider economic growth, ie, whether a country's economic circumstances are improving. And economic circumstances often impact a country's stock market. When a country's economy is weak, the stock market is often weak as well. According to Pratt (2008), various factors must be examined in macroeconomic research, including GDP (gross domestic product), the inflation rate, the interest rate, and the exchange rate.

Industry Analysis

An industry's success is determined by structural indicators, competency levels, supply-and-demand relations, aggregate product quality, operational cost considerations, and regulatory constraints for specific industries (Nurlaily and Nuzula 2020). Under particular economic circumstances, not all industries grow at the same pace. In addition to economic development considerations, government constraints influence industrial expansion. Each sector has its own fiscal policy. Industrial and macroeconomic stability are determined by government policies (Crescenzi, 2008). This research must adhere to a number of rules in order to estimate the industrial growth potential of Indonesia. To boost firm growth, the Indonesian government is simplifying startup licensing and introducing an incubator program.

Firm's analysis

The firm's analysis predicts future profit projections and corporate sizes. Investors evaluate a firm 's resilience, profit potential, and risk. This information determines the firm's intrinsic value (Nurlaily and Nuzula 2020).

Firm valuation

Djaja (2017) identifies three broad assessment approaches, including:

Asset Based Valuation Method

The asset-based valuation technique puts a significant focus on the value of a company's assets when assessing its fair market value. This method mostly looks at a company's physical and tangible assets, which can be turned into cash or cash equivalents if the company's assets are sold or liquidated.

Relative/Market Valuation Method

The relative valuation approach, also known as the market valuation method, rejects the notion that the value of an asset is highly reliable on the evaluation findings of the asset's components, which are difficult to compute or define.

Economic Valuation Method

The economic valuation technique departs from the notion that an asset can be evaluated by considering its usefulness and how it can be utilized in the future to produce value for the organization. It is a method of gaining economic value by investing in a company.

The authors employed the economic valuation approach of DCF in their investigation. According to financial literature, the fair market value of a continuing firm is the present value of its foreseeable cash flows. The DCF valuation technique is based on this basic conceptual framework. The DCF approach's calculations are straightforward, consisting of just adding the present value to the expected future flows (Larabe & Voss 2013).

The DCF model is based on the idea that all assets have an "intrinsic value" that can be estimated or calculated based on their characteristics, taking cash flow, growth, and risk into account, and after estimating the following phases:

Firm growth

According to Damodaran (2011), while assessing new enterprises in development, the most significant criterion to evaluate is predicted growth. To make a firm valuable, forecast tiny

sales into huge revenues (negative margins turn to positive) since growth is a factor driving value. The following are the critical growth variables that must be addressed:

- Revenues: at least two elements, according to Damodaran (2021), affect the development of young enterprises. The first consideration is market size; organizations with a broader market scope will have a higher income than those with a narrower market scope. The second revenue stream from the company's industrial sector that will be evaluated is the largest and the smallest. It is crucial to set expectations for the lowest and highest income levels.
- Operating profit margins (OPM): the primary determinant of value is revenue, but the value created is contingent on operational profit. Damodaran (2009) and Shater (2021) state that one method for calculating operational income is to multiply sales by operating margin.
- Reinvestment: according to Ahern (2021), considering the effect of reinvestment is one technique to help manage cash flow, where investing is conducted to foster future company development and improve sales. Due to the fact that the firm employs invested capital, it is vital to consider the influence on cash flow and the efficiency of the reinvestment.
- Probability of Failure: according to Damodaran (2009), the failure rate of startup firms will decline with time, as shown by a positive cash flow. Damodaran predicts that the value of startup companies will remain steady until the tenth year after their initial public offerings. In addition, Damodaran utilizes the probability of failure for a case study to determine the worth of a secure mail startup firm, where the proportion of failures after an initial public offering is as follows:

Table 2. Probability of Failure

End of Year	Probability of Failure
Current	40%
1	35%
2	30%
3	25%
4	15%
5	10%
6	5%
7	0%
8	0%
9	0%
10	0%

Financial projections

According to Djaja (2017), there are many phases of financial performance forecasting, including: evaluating the company's previous financial performance; examining its industrial expansion; and building possibilities for the company's work plans in the forecast period; preparing precise financial report predictions for each profit, loss, balance sheet, and cash flow; as well as the supporting reports.

Determine the cost of capital

Firms utilize a discount rate derived from the weighted average cost of capital to calculate the cost of capital using free cash flow. The application of the capital asset pricing model yields the discount rate for equity. This model suggests that the cost of equity is composed of risk-free interest plus a premium to cover the systematic risk of an asset.

Terminal Values

The terminal value is the last piece of information required to calculate discounted cash flow after the cash flow has been approximated and the discount rate has been determined.

Real options valuation method

This model employs the fundamental computation of option instruments that are often used in financial transactions. In general, the value of an asset is the present value of the future cash flows that the asset will create. In the real option technique, the value of assets is determined based on existing assets, whereas the cash flow of assets is dependent on specified occurrences. In other words, the company's worth is a function of the present value of the free cash flow (explicit and terminal value) and the PV of the option, if a certain event occurs. The direction chosen by management will maximize value and minimize losses. One aspect of options is that they are not responsibilities but rather rights. Therefore, the option holder will only exercise the option if doing so would profit him.

Volatility

Volatility is the dynamic variance of an asset, and the aforementioned definitions lead to the conclusion that volatility is a statistical measurement of asset price fluctuations over a period of time, where the data used is a random time series (random) and is measured as the standard deviation (Suharsono, 2012). According to Suwanda (2011), assets with high volatility are subject to massive price changes, resulting in frequent sharp price declines or gains. Investors often refer to these assets as high-risk. According to Sova's (2013) study, stock volatility is a measure of uncertainty about future stock price changes. The higher the volatility, the greater

the likelihood that stock values will rise and fall. In the stock market, there are two forms of volatility: historical volatility and implied volatility.

Value Reconciliation

Reconciliation is useful for establishing the best acceptable value for the appraised item depending on the appraiser's factors. The weights are decided by aspects related to the strategy's suitability and the assessment process (Ramadan & Irawan, 2021). According to Kepi and SPI (2018), appraisers are not required to use more than one approach and/or methodology in valuation, especially if the appraiser has a high level of faith in the accuracy and reliability of one method, taking into account the details of the assessment assignment. However, if there are insufficient facts or observable input data in the market to generate credible conclusions using a single methodology, the valuer should consider employing a variety of techniques and methodologies, as well as more than one valuation strategy or method, to determine value.

RESEARCH METHOD

This study applied descriptive research techniques. The descriptive technique is used to explain current situations in order for the advantages of research discoveries to be utilized now and in the future. This thesis' study depends on financial report document sources. The case study data is investigated as an integrated whole with the purpose of developing in-depth knowledge of the item in question, which implies that the case study must be classified as exploratory and descriptive research. This study used data from online media to offer statistics on technology-based startup firms from twelve companies that were listed on the Indonesia Stock Exchange (IDX). The study started in June 2022. The research data consists of secondary data that has been published, such as a list of startup firms on the IDX, consolidated financial statements for the fiscal year 2020-2021, and historical stock price data from 2020 to 2021. The explicit reason for selecting a specific fiscal year is due to the comprehensive data that is already available until 2021. Data on macroeconomic factors such as the GDP growth rate, inflation, interest rates, and currency rates; Other sources of information include the internet, mass media, and other publications.

Data analysis for stock price valuation using discounted cash flows to firms and real options using the Black Scholes model: consider MAPPI (the Indonesian Appraiser Profession Society) and the data in the study to reconcile the two methodologies' values. Reconciliation compares market prices to determine whether Indonesian tech startup companies are undervalued or overvalued.

RESULTS

The number of outstanding shares of each technology-based startup firm is one of the basic descriptors of the companies listed. Table 3 provides a summary of the number of outstanding shares for the twelve technology-based startups.

Table 3. Summarizes the number of outstanding shares

Company name	Number of shares outstanding
PT Kioson Komersial Indonesia (KIOS)	717.239.900
PT M CASH Integrasi Tbk (MCAS)	867.933.300
PT NFC Indonesia Tbk (NFCX)	666.667.500
PT Distribusi Voucher Nusantara (DIVA)	1.428.571.400
PT Telefast Indoensia Tbk (TFAS)	1.666.666.500
PT Digital Media Maxima Tbk (DMMX)	7.692.307.700
PT Trimegah Karya Pratama Tbk (UVCR)	2.000.086.278
PT Buka Lapak Tbk (BUKA)	103.062.019.354
PT Tourino Guide Indonesia Tbk (PGJO)	759.859.095
PT Global Sukse Solusi Tbk (RUNS)	953.557.875
PT Hansel Davis Indonesia Tbk (HDIT)	1.524.680.000
PT Cashlez Worldwide Indonesia Tbk (CASH)	1.431.125.517

Company Financial Performance Analysis

In this scenario, the financial performance of the firms is summarized in Table 4.

Table 4: Financial Performance Summary

Issuer	Total Assets (in Million)		Liability (in Million)		Equity & Liabilities (in Million)		Net Profit (in Million)	
	2020	2021	2020	2021	2020	2021	2020	2021
KIOS	187.967	79.197	138.236	17.751	187.967	79.197	(41.637)	2.499
MCAS	1.835.183	2.134.534	503.266	617.517	1.835.183	2.134.534	72.398	141.358
NFCX	1.403.992	1.926.693	409.616	539.497	1.403.992	1.926.693	54.310	338.582
DIVA	1.154.965	2.360.148	272.970	211.681	1.154.965	2.360.148	64.367	1.266.422
TFAS	223.989	275.050	65.967	78.994	223.989	275.050	6.462	26.636
DMMX	800.066	1.085.765	115.644	134.423	800.066	1.085.765	32.021	239.152
UVCR	48.984	96.173	18.689	17.965	48.984	96.173	1.576.	5.572
BUKA	2.593	26.615	985	3.119	2.593	26.615	(1.349)	(1.675)
PGJO	11.430	22.089	388	635	11.430	22.089	(7.556)	(10.467)
RUNS	38.410	69.289	3.415	1.587	38.410	69.289	7.704	(10.879)
HDIT	413.960	464.610	53.128	110.963	413.960	464.610	4.191	(7.184)
CASH	199.871	154.988	87.012	49.843	199.871	154.988	(6.225)	(7.723)

Growth Estimation

Table 5 provides a recap of expected revenues, operating profit margin, and sales-to-capital ratio.

Table 5. Estimated Growth

Issuer	Revenues	OPM	Sales to Capital
KIOS	19%	20.36%	0.98
MCAS	15%	20.36%	0.98
NFCX	19%	20.36%	0.98
DIVA	19%	20.36%	0.98
TFAS	19%	20.36%	0.98
DMMX	15%	20.36%	0.98
UVCR	15%	20.36%	0.98
BUKA	22%	26.60%	0.73
PGJO	10%	26.60%	0.73
RUNS	19%	20.36%	0.98
HDIT	15%	20.36%	0.98
CASH	19%	20.36%	0.98

Company Valuation

This research considers the best scenario to project the company's valuation,

Discounted Cash Flow

DCF is used with the firm's free cash flow model to assess a company's intrinsic value. The following is a summary of the beta, equity cost, WACC, and DCF values from Table 6.

Table 6. Recapitulation of Calculation Results

Issuer	Raw Beta	Adjusted Beta	Cost of Equity (%)	WACC (%)	DCF value (IDR)
KIOS	-	1.21	7.86	7.70	86
MCAS	2	1.67	10.67	9.65	2.125
NFCX	0.49	0.66	4.46	5.21	1.957
DIVA	1.47	1.31	8.50	8.38	1.218
TFAS	-	1.21	7.86	7.43	92
DMMX	3.17	2.45	15.47	14.44	70
UVCR	0.52	0.68	4.61	5.09	48
BUKA	1.89	1.6	10.21	9.85	174
PGJO	0.36	0.57	2.65	4.04	24
RUNS	0.60	0.73	4.94	6.32	113
HDIT	0.38	0.58	4.02	4.76	261
CASH	0.52	0.68	4.59	5.41	57

Real Options

The subsequent evaluation employs the Black Scholes real option model, where it is required to know the relevant parameters for the evaluation's computation. Table 7 displays the outcomes of the evaluation of the real option parameters and the share price.

Table 7. Parameter Assessment Results and Price per Share with the Real Option Method

Issuer	Assets (million)	Liabilities (million)	Volatility (%)	JW (year)	(r) (%)	RO Value (IDR)
KIOS	79.197	17.571	5.68	5.91	7.36	95
MCAS	2.134.534	617.517	3.20	4.02	7.36	1.930
NFCX	1.926.693	539.497	3.35	2.21	7.36	2.202
DIVA	2.360.148	211.681	3.28	2.21	7.36	1.526
TFAS	275.050	78.994	5.12	1	7.36	121
DMMX	1.085.765	134.423	4.70	3.29	7.36	127
UVCR	96.173	17.965	5.36	6.41	7.36	42
BUKA	26.615.549	3.119.931	3.69	1	7.36	230
PGJO	22.089	635	4.65	3.20	7.36	28
RUNS	69.289	1.587	5.66	1	7.36	88
HDIT	464.610	110.963	5.22	1	7.36	237
CASH	154.988	49.843	3.96	2	7.36	78

Value Reconciliation

The intrinsic value is produced by reconciling the values derived from the discounted cash flow and real option techniques. Reconciliation is performed in order to determine the most acceptable value based on the variables examined by the appraiser. The weights are derived from several aspects of the adequacy of the assessment strategy and technique. One of the elements is the opinion of MAPPI practitioners (Indonesian Appraiser Profession Society) or their representatives registered with the IDX;

1. KJPP Rengganis, Hamid, and Partners, represented by Mr. Ir. Hamid Yusuf, MM MAPPI (Cert), FRICS, claimed the weighting of the two ways should be 55%–45%, with a weight of 55% for the method closest to the market price and the appraiser's preferred method.
2. KJPP Desmar, Ferdinand, and Partners, represented by Mr. Desmar Dam, SE, MM MAPPI (Cert), stated that value reconciliation could be done in two ways or with the same method. He proposed using data and observations to weight the largest value. A weighting of 55%–45% is acceptable as long as it's consistent with the researcher's procedure.

The researchers decided to use a weight of 55% for the Real Option method and 45% for the Discounted Cash Flow method based on the considerations of the two MAPPI practitioners, available data and facts, and references from several studies, including Paramitha

(2012) and Nugraha (2014), that stated that the Real Option method is better than the Discounted Cash Flow method in predicting IPO stock prices. The following are the reconciliation results:

Table 8. Reconciliation Results

No	Issuer	Assessment Method		Weighting		Weighting Results		Value (IDR)
		DCF (IDR)	RO (IDR)	DCF (%)	RO (%)	DCF (IDR)	RO (IDR)	
1	KIOS	86	95	45	55	39	52	91
2	MCAS	2.125	1.930	45	55	956	1.062	2.018
3	NFCX	1.957	2.202	45	55	881	1.211	2.092
4	DIVA	1.243	1.526	45	55	559	839	1.398
5	TFAS	92	121	45	55	41	67	108
6	DMMX	70	127	45	55	32	70	102
7	UVCR	48	42	45	55	22	23	45
8	BUKA	174	230	45	55	78	127	195
9	PGJO	24	28	45	55	11	15	26
10	RUNS	113	88	45	55	51	48	99
11	HDIT	261	237	45	55	117	130	247
12	CASH	57	78	45	55	26	43	69

DISCUSSION

DCF utilizes revenues, operating income, and reinvestments. It uses 2020 or 2021 financial reports to forecast revenue. For revenue growth, historical data on the average 10-year revenue growth of mature technology-based enterprises is examined. This was done due to a lack of high-quality historical starting data. Due to a lack of data on technology-based startup companies, it is essential to assess the growth in operating profit margins (OPM) for associated industries. Using the Damodaran Spreadsheet's operating income base, this study calculated the OPM value. In addition to reinvestment, the Damodaran Spreadsheet Sales to Invested Capital Ratio must be used to generate a sales-to-capital ratio. The results identified ten software (system and application) developers as KIOSKS, MCAS, NFCX, DIVA, TFAS, UVCR, RUNS, HDIT, and CASH.

The financial ratios included in the Real Option (RO) evaluation are asset value, debt value, debt term, risk-free interest rate, and volatility. The value of assets and liabilities is derived from the 2021 financial statements, while the period of the debt is derived from the average debt maturity of the evaluated organization. The risk-free rate is derived from government securities over the last decade. The volatility number is calculated using the standard deviation of the stock price from the date of the company's initial public offering

through December 30, 2021. The findings of the reconciliation between the two valuation systems also indicate that twelve companies are overvalued.

Table 9. Intrinsic Value Summary

Stock code	Score Intrinsic (IDR)	Closing Price Dec 2021 (IDR)	Information
KIOS	91	509	Overvalued
MCAS	2.018	9.525	Overvalued
NFCX	2.092	8.950	Overvalued
DIVA	1.388	2.150	Overvalued
TFAS	108	5.125	Overvalued
DMMX	102	2.720	Overvalued
UVCR	45	450	Overvalued
BUKA	195	430	Overvalued
PGJO	26	54	Overvalued
RUNS	99	276	Overvalued
HDIT	247	340	Overvalued
CASH	69	270	Overvalued

According to the report, IT startups are volatile. Supply and demand determine the rise and fall of stock prices. If the demand is great, the price will rise; otherwise, it will fall. From an examination of tech startup valuations, various variables impact overvalued tech startups in Indonesia.

External Factors Cause Overvalue

Macroeconomic Conditions

When the Bank of Indonesia cut interest rates from September 2017 to April 2018, investors sought other assets. When bank interest rates decrease, stock values often rise. As a result of the decrease in bank interest rates, several investors have shifted to more profitable financial instruments, such as the stock market. One million investors will treble by 2021. Young adults make up 59.81% of capital market investors. This increase in investors is attributable to BI and OJK's efforts to educate and enlighten the general public such that they would invest in banking and the capital market (CNBC, 2022).

Startup Company Industry Conditions

The Government of Indonesia, via the IDX, has also offered incentives to encourage startup firms in Indonesia to list on the stock exchange. In addition, the Financial Services Authority issued POJK Number 22 (POJK.04/2021), which facilitates the capital market entry of startup enterprises. In addition, to promote the new economy, the government has developed a

program for 1,000 technology-based businesses under the ministry of communications. Government assistance for startup firms has a favorable effect, such that the prices of technological startups trading on the floor of the stock market tend to increase in an upward direction. This is consistent with the findings of Edam et al. (2021), who determined that all shares on the Indonesia Stock Exchange reacted favorably to the 2016 economic policy package,

Market Conditions

Market manipulation may also be responsible for increased stock prices. Competent, experienced, well-capitalized, and well-educated investors manipulate the market by taking advantage of the trend of rising startup technology firms, causing follower investors to overreact to reports of greater use of technology. This is a result of the use of technology, particularly financial technology, and a knowledge of investing in technology. Young investors who use technology are more affected by company potential than basic performance when making investment choices.

This is consistent with the findings of Untari's (2017) research, which concluded that high levels of follower investors result in increased stock volatility. As a result, informed investors can increase their expectations by sharing information with other investors in an attempt to move stock prices. Consequently, when the market falls, followers will behave irrationally.

In addition to working with local investors who are skilled and have substantial cash, it is assumed that overseas parties have access to more research and information sources than local investors. This circumstance drives local investors to behave as follower investors in response to investment choices made by overseas investors. Foreign net purchases or sales often impact stock price fluctuations. If foreign investors conduct massive sales, the price will drop, and vice versa. This is consistent with the study conducted by the Volatility Team (2011), which showed that the value of foreign transactions has a substantial impact on the volatility of the JCI, which is one of the reasons why overseas investors are interested in the Indonesian capital market .

Internal Factors Cause Overvalue

Company fundamentals

The company's basic fundamentals are the primary determinants of growing or declining stock prices, which investors must constantly keep in mind. Companies with solid fundamentals will inevitably see an upward trend in their stock values. Certain new investors in Indonesia pay little attention to the company's fundamental reporting. Investment choices are affected by the

business prospects of technological businesses and have a tendency to disregard basic features, resulting in stock prices that do not reflect their real worth. In their study on manufacturing listed businesses on the Indonesia Stock Exchange, Arsawan and Suryantini (2014) determined that corporate value has a substantial positive influence on stock prices; as the stock value improves, so does the stock price.

Corporate actions

Corporate action is a management decision that, by its very nature, may affect the company's fundamentals. Corporate activities include acquisitions, mergers, rights offerings, and divestments. MCAS, one of the technology-based startup enterprises with pricing modifications, conducted a corporate move on March 26, 2021, by forming a new subsidiary, Si Fast Express, which resulted in a price increase from IDR 470 to IDR 4.500. Moreover, MCAS is a technology business that often engages in corporate operations, like the acquisition of PT Abyakta Data Sentosa in September 2021. TFAS created PT Tfas Energi Indonesia on September 28, 2021, and invested in PT Clodeo Indonesia Jaya in the digital sphere business the same year. DMMX launched PT Niji Sicepat Gamindo on September 13, 2021, in addition to growing money in PT Energi Always Baru (ESB), which helped increase DMMX's sales. According to Dhiya (2020), the share price after the purchase will change the company's position in a group with a high share value, which might improve investor trust.

LIMITATIONS & FURTHER RESEARCH

Despite the fact that this research was conducted using two different methods and approaches with various explorations such as macroeconomics, industry and company financial reports, the assessment has several limitations. First, the company value generated by the DCF method is based on the company's historical performance by considering the WACC and the company's growth assumptions. According to Renfield (2018), estimates of startup company projections do not only depend on cash flow, revenue, or historical profit margins but also on business plan assumptions, discussions with the management team, and long- and short-term business orientation. Because startup companies are developing companies, they require an optional expansion strategy.

This is obviously a lack of the DCF approach, which is based on a fixed scheme. Second, volatility greatly affects the value of the real option method, such as the Black Scholes model, where high volatility also affects stock prices. The high volatility of startup companies in Indonesia can be an obstacle to the accuracy of the assessment. Renfield (2018) states that high startup volatility is an obstacle to determining assessment predictions with high accuracy.

Because of the things mentioned above, it is for the benefit of further research, where the researcher suggests several things to improve the accuracy of the assessment. First, the lack of historical data on startup companies hinders the performance of effective appraisals. Therefore, it is necessary to compare the historical data of startup companies in the United States to get more accurate comparative data, considering that the United States has the largest startup ecosystem. Second, it is necessary to consider the real option method with the binomial tree model, where this model represents several possible paths that can accommodate the optional investment expansion of startup companies. For the accuracy of the assessment of the binomial tree model, the assessor needs to hold discussions with the management or founders of startup companies.

IMPLICATIONS

The bubble phenomenon in technology-based startup companies in Indonesia is very important for assessment activities. Assessments carried out according to Indonesian assessment standards are mandatory in order to avoid information asymmetry in startup company valuations. According to Firmansyah and Prayuda (2018), information asymmetry that develops as a result of cooperation between startup companies (founders) and initial investors to continue to develop the company quickly and aggressively can have implications for the emergence of fraud in startups.

The company's agility capability is very important for companies to improve by adjusting to market conditions and operating efficiently so as to generate positive cash flow. Of course, these things are expected to increase the value of startup companies. as regulators, the IDX and the Financial Services Authority have an important role in managing information on technology-based startup companies. This is required to maintain market confidence for a variety of reasons, one of which is to protect retail investors from investment failure. As regulators, the IDX and the Financial Services Authority need to ensure optimal information provision from startup companies that decide to conduct an initial public offering. Regulations for initial public offerings also need to be tightened by the IDX and the Financial Services Authorityto ensure the integrity of the capital market.

The issue of the exit strategy of the startup company founders is something that needs to be paid attention to by the IDX and the Financial Services Authority in maintaining market conduciveness. For this reason, additional rules are needed in addition to POJK No. 22 and POJK No. 4/2021, which protects investors and founders. In fact, this additional rule can maintain the cycle of the startup ecosystem so that it continues to grow in Indonesia.

The results of the study, which indicate that twelve startup companies are experiencing overvalued conditions, are a compelling argument for implementing a valuation process in accordance with applicable valuation standards, so that additional investors can see the company's condition as a whole and thereby avoiding an unfair assessment. According to Miloud et al. (2012), more precise valuation methodologies not only minimize disagreements between entrepreneurs (founders) and investors but also aid both parties in defending their judgments in court against public partners or other stakeholders. It is believed that the development of technology-based startups will mirror global growth patterns; however, startup excitement must adhere to conventional assessment criteria and pay close attention to the basics.

CONCLUSION

According to the results of research and discussion, the following conclusions are obtained: The results of stock valuation using the DCF method are each KIOSKS with a value of IDR. 86; MCAS with a value of IDR. 2.125; NFCX with a value of IDR. 1.957; DIVA with a value of IDR. 1.218; TFAS with a value of IDR. 92; DMMX with a value of IDR. 70; UVCR with a value of IDR. 48; BUKA with a value of IDR. 174; PGJO with a value of IDR. 24; RUNS with a value of IDR. 113; HDIT with a value of IDR. 261; as well as CASH with a value of IDR. 57.

The results of stock valuation using the RO method are: each KIOSKS with a value of IDR. 95, MCAS with a value of IDR. 1.930; NFCX with a value of IDR. 2.202; DIVA with a value of IDR. 1.526; TFAS with a value of IDR. 121; DMMX with a value of IDR. 127; UVCR with a value of IDR. 42; BUKA with a value of IDR. 230; PGJO with a value of IDR. 28; RUNS with a value of IDR. 88; HDIT with a value of IDR. 237; as well as CASH with a value of IDR. 78. The results of the reconciliation between the two methods also show that the 12 technology-based startup stocks are overvalued when compared to their closing prices on December 30, 2021.

The weighting on the reconciliation is 55% for the real option method and 45 % for the discounted cash flow method. This shows that in this study, the real option method is better than the discounted cash flow method based on the quality and quantity of data collected during the observation process. The results of the reconciliation between the two methods also show that the 12 technology-based startup stocks are overvalued when compared to their closing prices on December 30, 2021. The weighting on the reconciliation is 55% for the real option method and 45% for the discounted cash flow method. This shows that in this study, the real option method is better than the discounted cash flow method based on the quality and quantity of data collected during the observation process. The results of the reconciliation between the two methods also show that the 12 technology-based startup stocks are overvalued when compared

to their closing prices on December 30, 2021. The weighting on the reconciliation is 55% for the real option method and 45% for the discounted cash flow method. This shows that in this study, the real option method is better than the discounted cash flow method based on the quality and quantity of data collected during the observation process.

From the analysis carried out on overvalued stock values, it can be concluded that there are several things that cause overvalued conditions, including: External company conditions, such as declining bank interest rates, government support, the behavior of local investors, and the role of foreign investors: Internal company conditions, such as corporate actions taken by several technology startups, including MCAS, TFAS, and DMMX, Another factor is the lack of attention paid to the company's fundamental reports by investors.

SUGGESTIONS

The suggestions for this research are as follows: for companies, increasing the operating profit margin is very important, as it is known that most startup companies/young companies in Indonesia have a smaller operating profit margin, which is inversely proportional to revenues. Improving company agility is very important for generating positive cash flow, so that in the end it can increase company value. For investors, it's important to look at the pundametal aspect and value startup companies based on how they've done in the past, not how they might do in the future.In the future, investors must be more conservative because the phenomenon of the fall of start-up companies has started to appear recently.In order to analyze factors other than the company's internals, appraisal practitioners must use a top-down approach.

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