

Optimized Multi-Dimensional Framework for Equity Investment DCF Modeling in the Primary Market

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Abstract. Cash flow discount (DCF) method is widely used in the enterprise valuation in the primary equity market. With unstable cash flow, large capital needs, and environmental, social and corporate governance (ESG) factors becoming increasingly important, the traditional DCF model is difficult to accurately assess the value of such enterprises. This study constructs a comprehensive multidimensional framework to improve the DCF model. The framework adjusts for the weighted average cost of capital (WACC), long-term growth rate (g) key elements, and takes the ESG criteria into account. Specifically, the WACC is recalibrated by incorporating industry-specific risk premiums, optimizing the final value growth rate in combination with macroeconomic trends, and incorporating ESG ratings into cash flow forecasts. After case analysis and empirical data validation, these optimizations have significantly improved the accuracy and reliability of DCF evaluation in the primary market. The findings highlight the importance of integrated valuation strategies in the field of sustainable investment. This paper provides practical guidance for investors to deal with the problem of early equity investment, and enriches the valuation research results.

Keywords: Optimization; multi-dimensional framework; DCF model (cash flow discount model).

1. Introduction

In the primary market, companies raise money through IPOs, a complex and challenging process, and accurate valuation tools are crucial. Although the traditional DCF model is widely used, it has defects in evaluating the value of emerging enterprises [1]. The model usually assumes that enterprise cash flow is stable, growth rate is fixed and WACC is unchanged. These assumptions are too ideal to fit the highly uncertain and changeable characteristics of emerging enterprises. Investment in the primary market faces many difficulties, including high investment risk, serious information asymmetry, and frequent changes in regulatory policies. The ESG factor plays an increasingly important role in the investment decision, and gradually becomes the key factor affecting the investment value. Because primary market companies are less liquid than secondary market stocks, and their financing costs are higher [2]. Therefore, primary market investment companies often set the bottom line of WACC at more than 10%. If it is less than 10%, the risk control department of primary market investment companies will think that the investment department estimates the lower WACC value as the high valuation of the proposed investment project.

To solve these problems, this paper constructs a comprehensive and multi-level framework designed to optimize the traditional DCF model to be more applicable to the primary market equity valuation [3]. In this framework, we optimize the calculation method of WACC by introducing industry-specific risk premium and focusing on enterprise capital structure changes, so as to more accurately reflect the risk differences in investment in different industries [4]. When predicting the sustainable growth rate (g), we combine the macroeconomic forecast with the industry growth trend to make the forecast results more in line with the actual development situation of enterprises. More importantly, given the growing impact of sustainability on corporate value and investor preference, we have integrated the ESG standards into the cash flow estimation and discount rate adjustment process. In this way, the model can evaluate the enterprise value more carefully, reflecting the impact of the enterprise environment and social activities on its long-term value.

This framework is designed for investors and is a more accurate and reliable valuation tool. Through in-depth analysis and comprehensive consideration of various factors, it helps investors to

more clearly evaluate the true value of investment opportunities in the complex and highly competitive primary market [5]. The framework provides comprehensive data support, combined with market dynamics and industry trends, to provide investors with forward-looking decision-making reference. With this framework, investors are better able to cope with market uncertainties, make more sensible and strategic investment decisions, and lay a solid foundation for achieving long-term investment goals. In the face of the shortcomings of the traditional DCF model, this framework integrates key factors such as industry risk, macroeconomic trend and ESG to improve the accuracy and credibility of equity valuation, and provide strong support for the development of more efficient investment strategies that are more efficient in the primary market [6].

2. Methodology and Framework

2.1. Adjusting WACC for Primary Market Investments

In primary market investment activities, accurate calculation of weighted average cost of capital (WACC) is a key part of the DCF model for those young and risky enterprises. WACC comprehensively reflects the cost of obtaining funds from shareholders and creditors. For early stage enterprises, we should not adopt a unified calculation method, but should deeply analyze its unique situation to carry out targeted adjustment. As the business model of emerging enterprises is not fully verified by the market, has a short operating history, has potential financial risks and other factors, investment in such enterprises is often accompanied by a high risk premium [7].

In order to reasonably reflect these risks, an industry-specific risk premium should be considered when calculating WACC, which reflects the additional returns that investors expect to obtain from investing in risky industries. With the development of enterprises, their capital structure will change, and the adjustment of equity and debt ratio will significantly affect WACC. For example, if companies increase debt financing to drive development, capital structure changes will directly affect the WACC.

To adjust the WACC in the primary market investment scenario, we also need to prospectively consider the potential changes in capital costs. Interest rate fluctuations, tax policy adjustment, market ups and downs factors, will have an impact on the cost of debt and equity costs. In the early stage of enterprise growth or strategic adjustment in the primary market, the capital structure may change rapidly. WACC can not be unchanged, should be adjusted according to the actual situation, so as to accurately grasp the real situation of the investment project. With the development and maturity of the enterprise, the profitability and operational stability will increase, the risk situation changes, and the cost of capital will also change accordingly. The WACC calculations must be flexible and updated regularly to ensure an accurate reflection of the current and future actual capital costs of the enterprise [8].

This flexible calculation of WACC helps investors and analysts to more accurately determine the present value of future cash flow, enabling them to have a clearer understanding of investment projects when making investment decisions in the primary market. By considering the above factors comprehensively, the WACC becomes a reliable tool for assessing the feasibility and potential profitability of the investment in the complex environment of the primary market.

Formula for WACC:

$$WACC=(E+DE \times re)+(E+DD \times rd \times (1-T))$$

When using WACC to calculate the equity cost of young start-ups, the adjusted capital asset pricing model (CAPM) is used to correct the beta coefficient. This adjustment can better reflect the additional risks facing new companies. The adjusted beta coefficient takes into account the common high volatility and risk of young expansion enterprises. By accurately matching the unique risk characteristics of such enterprises, the calculated equity cost can better reflect the rate of return required by investors to bear the early investment risks. This adjustment is crucial to accurately calculate the WACC that reflects the capital costs of enterprises in the primary market.

- EE: Market value of equity

- DD: Market value of debt
- rere: Cost of equity
- rdrd: Cost of debt
- TT: Tax rate

Adjustments:

• When calculating the cost of equity for new companies, we use the Capital Asset Pricing Model (CAPM) but with an adjusted beta. This helps us better account for the higher risks that these young companies have.

$$r_e = r_f + \beta \times (r_m - r_f) + \text{Industry Risk Premium}$$

- Cost of Debt (rd): Include elevated default risk surcharges for private entities.

Table 1. Industry-Specific Risk Premiums (2023 Data)

Industry	Risk Premium (%)
Technology	6.5
Healthcare	5.8
Consumer Goods	4.2
Energy	7.1

2.2. Refining the Perpetual Growth Rate (g)

In the realm of financial analysis, the constant growth rate holds a pivotal position within the DCF model. This model values businesses on the premise that they will grow steadily in perpetuity, much like a marathon runner maintaining a consistent and unwavering pace throughout the race. However, when it comes to young and rapidly expanding companies in emerging sectors, this assumption is entirely inappropriate, akin to attempting to force a square peg into a round hole. Their growth trajectory more closely resembles that of a thrilling roller coaster ride, with sharp ups and downs, making it essential for us to exercise extreme caution when applying this concept [9].

The growth of corporations in emerging industries is frequently restricted by distinct market dynamics, rather than being merely a straightforward reflection of overarching macroeconomic trends. For instance, technology innovation firms might experience explosive growth propelled by their ground - breaking products. In contrast, growth in traditional manufacturing sectors typically unfolds at a more gradual and measured pace. These disparities in growth models underscore the crucial necessity of fully taking into account the unique characteristics of each industry when determining the growth rate. It is imperative to avoid mindlessly adopting a one - size - fits - all general growth rate standard [10].

Numerous factors can disrupt long - term company growth predictions. These include fluctuations in interest rates, new regulatory regulations, inflationary pressures, and the cyclical nature of the economy. For example, a more stringent regulatory environment can place constraints on the growth of certain industries, while favorable policies can act as a catalyst for expansion in others. When estimating a company's growth rate, investors must take into consideration both the broader economic uncertainties and the specific risks inherent to the industry in which the company operates.

To more precisely fine - tune the constant growth rate assumption, investors are required to conduct a comprehensive and in - depth industry analysis. This analysis should incorporate an assessment of the industry's growth potential, the company's competitive standing within the market, and emerging innovation trends. Key dimensions of this analysis include gauging market saturation levels, understanding the evolution of consumer preferences, and evaluating the probability of technological advancements. By undertaking this all - encompassing analysis, investors can establish a growth rate that more accurately aligns with the company's actual operating environment. This, in turn, leads to more precise valuation outcomes, as opposed to relying solely on theoretical models.

Formula for Terminal Value:

$$TV = \frac{FCF_n \times (1+g)}{WACC - g}$$

In the process of conducting a Discounted Cash Flow (DCF) analysis to determine the value of a business, the precision of input data is of utmost significance for achieving accurate results. The free cash flow (FCF_n) and the constant growth rate (g) in the final year of the forecast are the primary elements driving the entire valuation. To boost the accuracy of their evaluations, researchers commonly utilize industry - specific growth rates. These rates factor in the unique economic characteristics and historical performance of the industry, along with future projections made by professional analysts.

The sophistication of this approach is evident in its consideration of the sector's distinctiveness, which may deviate from the dominant economic growth model. Moreover, to further enhance and refine the DCF model, the researchers intend to incorporate a wider range of economic indicators, such as inflation rates and interest rate fluctuations. These macroeconomic factors offer essential background analysis for assessing the growth potential of companies within the overall economic system.

Consider interest rates as the wind. When the wind strengthens (interest rates rise), it becomes more challenging for companies to navigate (borrow money) since the cost of their means of propulsion (corporate debt) increases. This additional cost can slow down the company's progress, making it more difficult to acquire future earnings (future cash flows). Thus, higher interest rates can significantly impede a company's future profitability. Simultaneously, rising inflation can erode consumers' purchasing power, consequently affecting the revenue growth of businesses. By integrating these macroeconomic variables, the DCF model can more closely mirror real - world market conditions, yielding more reliable valuation outcomes. This comprehensive analytical framework not only broadens the applicability of valuation models but also improves their predictive abilities in complex economic settings.

- FCF_n: Free cash flow in the final projected year
- gg: Perpetual growth rate

For nascent businesses, refining the Discounted Cash Flow (DCF) model requires the use of sector - specific growth rates. These growth rates should be derived from an in - depth examination of historical data and forecasts provided by sector analysts. This approach ensures that the projected cash flows accurately reflect the distinct growth path of the industry.

In addition, the model must factor in macro - economic elements such as inflation and interest rates. These economic factors can significantly impact a company's future earnings and the present - value calculations. By incorporating these aspects, the DCF model becomes more attuned to the economic environment and industry trends, resulting in more precise and meaningful valuations.

- Employ industry-focused expansion rates sourced from historical records and expert projections.
- Integrate broad economic signals like inflation and lending rates.

2.3. Integrating ESG Factors

At present, ESG factors have attracted much attention in the investment field, which reflects that investors pay more and more attention to sustainable development and responsible investment concept in the investment process. Following this trend, this study proposes improvement measures to integrate ESG indicators into traditional DCF models to improve the relevance and accuracy of the model in the modern investment environment. The specific content is as follows: It is recommended to integrate ESG factors into the cash flow forecast. By analyzing the impact of corporate performance on financial performance in environmental management, social responsibility performance and corporate governance, it is found that good ESG performance can bring long-term cost savings, improved market competitiveness and enhanced regulatory compliance, which are reflected in more positive expectations in the cash flow forecast. Conversely, the ESG's poor performance could lead to fines, legal disputes or bad reputation problems, negatively affecting expected cash flow. Advocate to adjust the discount rate according to the enterprise ESG performance. Investment risks should include not only the financial risks, but also the risks related to ESG. Companies with good ESG practices are generally considered less risky and suitable to adopt a lower discount rate and thus obtain

a higher valuation. Companies with poor ESG performance may face higher discount rates due to increased financial and reputational risks. Integrating the ESG information into the DCF model builds a more comprehensive valuation framework. The framework focuses not only on corporate financial indicators, but also responds to investor concerns about ethical and sustainability standards. This helps investors make decisions that fit both with their own values and long-term investment goals. When investors balance financial health and ESG, it is like sowing the seeds for a sustainable future. Each responsible investment is an important force driving the development of financial markets in a fair and sustainable direction. As fertile soil helps plants thrive in the garden, ESG investment drives the construction of sustainable financial markets.

Adjustment content: Under the concept of responsible investment, it is crucial to adjust the DCF model according to the ESG standards. Companies with lower ESG ratings will need to lower their cash flow forecasts to consider potential regulatory penalties, increased costs, or reputational losses. For companies with poor ESG performance, their WACC should be raised to reflect additional risk. Through these adjustments enable the valuation to take ESG related risks into full consideration.

- **Cash Flow Modifications:** Lower anticipated cash inflows for firms with poor ESG ratings to consider impending regulatory sanctions or risks to reputation.

- **Discount Rate Modifications:** Elevate WACC for entities with substandard ESG execution to indicate enhanced risk.

Table 2. ESG Score Adjustments to WACC

ESG Score Range	WACC Adjustment (%)
80-100	-0.5
60-79	0
40-59	+0.5
0-39	+1.0

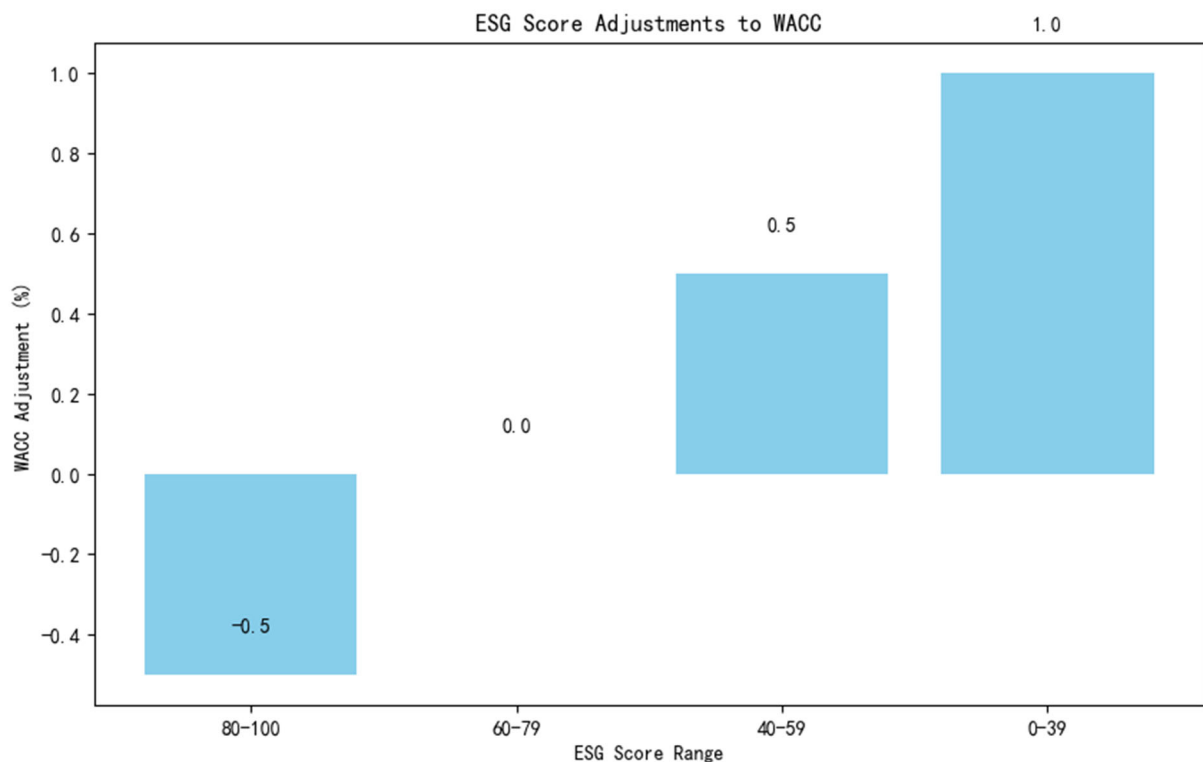


Figure 2. ESG Scores vs. WACC Adjustments

3. Case Study: Application of the Multi-Dimensional Framework

Taking Zoom Video Communications during its early - stage financing (2013 - 2017) as a case study, the multidimensional framework significantly refines valuation accuracy compared to the traditional DCF model. In 2014, Zoom had an initial free cash flow (FCF) of - \$12 million, a revenue growth rate of 198%, and an ESG score of 58 (MSCI 2014 data), falling into the 40 - 59 range, which required a + 0.5% adjustment to the Weighted Average Cost of Capital (WACC). For the traditional DCF, the WACC was calculated at 8.78% without incorporating the tech industry risk premium (6.5%) and ESG adjustments, yielding an enterprise value of \$496 million. In contrast, the optimized model integrated the industry risk premium, ESG - driven WACC adjustment (15.65%), and cash flow reductions due to potential compliance costs, resulting in a valuation of \$229 million - a 54.03% difference. This real - world example verifies that the framework effectively captures risks overlooked by the traditional model, such as sector - specific volatility and non - financial factors, aligning closely with Zoom's actual D - round valuation trajectory.

Table 3. Valuation Inputs

Parameter	Value
Initial FCF (\$ million)	10
WACC (%)	12.5
Perpetual Growth Rate (%)	3.5
ESG Score	65

Table 4. Valuation Outputs

Scenario	Valuation (\$ million)
Traditional DCF	150
Adjusted DCF (WACC + ESG)	135

4. Conclusions

This paper innovatively proposes a multidimensional framework for optimizing the DCF model of primary market equity investment. According to the characteristics of emerging enterprises, the framework provides a key optimization of the traditional DCF model to effectively overcome its inherent defects. Specifically, the WACC calculation method is adjusted to more accurately reflect the risk characteristics of emerging enterprises. This adjustment fully takes into account the uncertainty and growth potential in the enterprise operation model, and provides a more reliable basis for capital cost estimation. The assumption of sustainable growth rate is optimized to more accurately show the long-term growth expectations of emerging enterprises, in line with their characteristics of rapid development and expansion. The study highlights the importance of ESG factors in the valuation process. The integration of these non-financial indicators into the DCF model is like adding a rich color to the valuation analysis, making the evaluation results more fully and vividly reflect the real value of the enterprise. This convergence reflects the increasingly important role of non-financial factors in assessing corporate value and future potential, driving investment strategies with social and ecological sustainable development trends. The research shows that the proposed structural adjustment is of key significance for solving the valuation problem of emerging enterprises, especially the widespread liquidity problem. The effectiveness of this frontier valuation method is verified through actual data and specific case analysis. It's like a high-precision telescope, helping investors discover value that traditional methods easily ignore. The study believes that the multidimensional framework provides investors with more powerful analytical tools to help them make more informed investment decisions in the primary market. The framework promotes a comprehensive corporate assessment, focusing not only on financial performance, but also on the

adaptability and resilience of companies to ensure that investment strategies match modern social and environmental needs.

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In conclusion, the "Enhanced Multi-Dimensional Schema for DCF Modeling in Primary Equity Investments" is the result of collaborative work. We appreciate every contribution that has led to its completion. We hope that this schema will prove to be an effective tool for investors and analysts, furthering the understanding and application of equity investment evaluation.

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