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Quantitative Valuation of Startups

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Abstract: Valuing growth-stage startups is complex due to limited historical data and volatile growth dynamics. This thesis examines three quantitative methods - Venture Capital Method, Damodaran Discounted Cashflow Method, and First Chicago Method - using Too Good To Go as a case study. It provides step-by-step applications, comparative analyses, and sensitivity assessments, culminating in a balanced approach that addresses startup-specific risks. By integrating academic rigor with practical insights, this study offers actionable frameworks for practitioners and students to navigate the unique challenges of startup valuation, enhancing their understanding of applying theoretical models in uncertain and dynamic environments.

Keywords: Startup Valuation, Discounted Cashflow, Venture Capital, First Chicago Method, Discount Rates, Survival Probabilities, Monte Carlo Simulation, Risk Adjustment

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1. Introduction

Valuing startups is a critical and high-impact undertaking, essential not only for investors betting on the next big innovation but also for founders, employees, and strategic partners seeking to understand the true potential of a business. Unlike established companies with rather predictable revenues and extensive financial histories, startups operate in environments marked by high volatility and limited data. For investors, an adequate valuation can mean the difference between seizing a game-changing opportunity and making a costly misstep. Startups typically progress through four main phases: the pre-seed/seed phase, the startup phase, the growth phase, and the maturity phase. While in the seed and startup phases, the operating model may still be a vague idea, the growth phase is characterized by rapid expansion, scaling operations, and increasing market share. During this stage, cashflows become more consistent, and the company approaches profitability, allowing for more detailed quantitative analysis (Rzepka et al. 2016, 312). This thesis focuses on valuing startups in the growth phase, where at least some actual data is available, albeit with limitations, and can be combined with assumptions to build robust valuation models. The purpose of this thesis is twofold. First, it aims to provide a structured framework for evaluating startups during the growth phase by exploring three established quantitative valuation methods: the Venture Capital Method (VCM), the Damodaran Discounted Cashflow Method (DM), and the First Chicago Method (FCM). Second, it seeks to enhance the learning experience for students and professionals by using the company Too Good To Go (TGTG) as a real-world case study. By working through this case, readers will gain insights into the intricacies of startup valuation while learning to navigate the challenges of applying theoretical models to dynamic and uncertain environments. This thesis has been developed with a strong educational focus, offering practical applications of valuation methods under conditions of uncertainty. It presents TGTG's unique challenges and opportunities, simulating the information analysts or students might encounter in a real-life

scenario. Each valuation method is presented as a step-by-step guide to ensure replicability and facilitate classroom learning. Additionally, the teaching note ([Appendix 1](#)) offers learning objectives, discussion prompts, and guided solutions, making this thesis a valuable resource for both academic and professional development. In collaboration with RSM Ebner Stolz, a firm with extensive experience in startup valuation, this work integrates academic rigor with practical expertise. Ultimately, the recommendation synthesizes the strengths of the three methods, addressing their weaknesses, to propose a balanced and pragmatic approach to quantitative startup valuation. This ensures that readers, particularly students, not only understand theoretical models but also appreciate their real-world applicability and limitations.

2. Startup Specific Challenges in Valuation

While obtaining essential metrics for established, and often publicly traded companies is relatively straightforward, estimating these metrics for startups, presents unique challenges. These difficulties stem from the distinctive characteristics of startups, which complicate the valuation process (Damodaran 2010, 7). Both in theory and practice, it is widely accepted that the value of a company lies in its ability to generate future cashflows. Therefore, the cashflow-based valuation approach (often referred to as income approach) is generally regarded as the most appropriate for valuing companies (Institut der Deutschen Wirtschaftsprüfer e.V. [IDW] 2008, 4). Thus, this paper solely focuses on determining which of the cashflow based methods presented later is most suitable for application in the context of startups.

2.1 Cashflow from Existing Assets

Valuing existing assets involves analysing a firm's current financial statement and historical data. These assets represent resources currently used to generate cashflows but typically account for only a small portion of a young firm's overall expected future value. For startups, the main drivers of growth and success are future investments and opportunities for expansion.

The lack of historical data for a startup's future operating business model complicates the forecasting of cashflows, further exacerbated by changing macroeconomic conditions and competitive pressures. Additionally, growth-related expenses often overlap with current operational costs, particularly in categories like Selling, General & Administrative (SG&A). For example, costs for acquiring future customers inflate total expenses relative to current revenues, making it difficult to distinguish between operational and growth-related expenditures (Damodaran 2010, 7-8).

2.2 Discount Rates

Estimating discount rates for early-growth companies is particularly challenging due to several factors. Startups often lack historical price data because they are not publicly traded, making it impossible to run regressions to estimate equity beta or quantify the company's risk relative to the market. Additionally, without publicly traded bonds, estimating the cost of debt becomes complex, as existing financing agreements are typically private and include specific terms beyond the interest rate. To account for the higher risks associated with startups, investors demand higher returns. However, observable returns generally pertain to mature companies in established capital markets, which have significantly lower risk profiles and are not directly comparable (Damodaran 2009, 48-50).

2.3 Growth

For startups, the majority of their value typically comes from growth assets, making the valuation of these assets a significant challenge. First, many young companies either have no or limited revenues or lack a reliable revenue history, which means that past revenue growth cannot be used to estimate future growth (Kühnapfel 2015, 2). As a result, analysts often have to rely on the company's own projections for future revenues, which will be subject to bias. Even when future revenue estimates are available, predicting how earnings will evolve as

revenues change is problematic. Moreover, the value of a company is not determined solely by revenue or earnings growth, but by the relative return on invested capital. Assessing this quality involves determining how much the firm is reinvesting to generate growth and whether its return on capital exceeds its cost of capital. Furthermore, the current return on capital will often be negative, making it an unreliable starting point for estimating future returns. These challenges are compounded by the uncertainty around reinvestment assumptions and the difficulty in determining whether future growth will create value by generating returns that exceed the cost of capital (Damodaran 2010, 8-9).

2.4 Terminal Value

The terminal value plays an even larger role in the valuation of startups compared to established firms, often making up 90% or more of their total value. It reflects the anticipated value of the company after the initial forecast period, capturing most of its expected future cashflows companies (Institut der Deutschen Wirtschaftsprüfer e.V. [IDW] 2008, 27). As a result, assumptions about when a firm will reach stable growth and its characteristics during that phase significantly influence the overall valuation. Several key uncertainties complicate this process. First, there is the question of whether the firm will survive long enough to reach stable growth. Given the high failure rate among startups many may never achieve this phase, and their terminal value may not materialize as expected. Estimating the probability of survival early in a firm's life cycle is therefore crucial, though difficult. Second, even if the firm does survive, determining when it will become a stable growth company is challenging. Lastly, the characteristics of the firm in stable growth, including its growth rate, risk profile, and ability to generate excess returns, are critical in determining terminal value. Assuming the company will continue to generate excess returns indefinitely results in a higher terminal value, whereas assuming these returns will diminish or become negative lowers the estimate (Damodaran 2010, 10-11).

3. Startup Valuation Methods

3.1 Venture Capital Method

The VCM is a widely used method for valuing startups, focusing on capital gains from resale (typical of investors with a dealer mindset) rather than the long-term success of the target company. Unlike strategic investors, venture capital firms invest with the goal of exiting within three to seven years, aiming for a return that is a multiple of their initial investment. The VCM especially emphasizes the eventual exit value and investor returns (Rapaka 2023, 147).

3.1.1 Calculation of the Exit Value and its Present Value

The focus is to estimate the company's value at the time of exit, typically through an Initial Price Offering (IPO) or a competitive sale. Three common methods to estimate the exit value are relative valuation, absolute valuation, and the successful exit method within the same industry. To convert the exit value to its present value (PV), an appropriate discount rate is needed. Venture capitalists typically use a high target return due to the high failure rates of startups. However, they do not base this rate solely on specific operational risks. Instead, they apply standard markups that are more aligned with the company's development stage than with its individual risk profile - the younger the company, the higher the markup. The expected exit value is calculated by multiplying the exit value by the likelihood of a successful exit. If the expected exit occurs after T years, the PV of the exit is calculated as follows:

$$PV = \frac{\text{Exit Value} \times p}{(1 + VC \text{ discount rate})^T}$$

Additionally, the value of a startup is generally determined by discounting its exit value, with adjustments for the retention rate to account for dilution from future funding rounds. However, this approach won't be considered here as it represents an investor-specific valuation (Rapaka 2023, 148-151).

3.2 Damodaran Discounted Cashflow Method

3.2.1 Estimation of Future Cashflows

The DM by Damodaran (Damodaran 2010, 19-20) involves estimating future cashflows despite the inherent uncertainties of startups. Rather than only focusing on revenues and earnings, a comprehensive approach is essential. Analysts can either use a "top-down" or "bottom-up" approach. The bottom-up approach focuses on determining capacity constraints and associated costs, making it a more conservative method for projecting future financial performance. This approach is best applied to businesses that face limitations on raising capital or rely heavily on key individuals (Damodaran 2010, 28-32). In the following, a focus will be set on the top-down approach as this method is particularly suited for startups, where estimating the total market potential provides a structured basis for deriving revenue forecasts and assessing capacity and capital requirements (Damodaran 2010, 20).

3.2.1.1 Top-Down Approach

The for the selected case-study relevant approach focuses on market size estimation which begins with defining the company's product or service, as a broader or narrower definition will impact the potential market size (Kühnapfel 2015, 17). Moving on to market share estimation, this step involves predicting the firm's eventual share by assessing the quality of its products, management capabilities, and available resources. Next, estimating operating expenses becomes crucial, though startups often lack sufficient historical data. To address this, target margins of established competitors can be used as benchmarks, while factoring in how the company's margins might evolve over time. At this stage, it is advisable to avoid excessive detail in forecasts, as high uncertainty can reduce precision. As a follow-up, investment for growth must be considered, as revenue and margin expansion require reinvestment in areas like production capacity or research and development. In addition, tax effects must be taken into account. Finally, it is essential to check for internal consistency between revenue growth and

reinvestment. This can be done by calculating the imputed return on capital, which compares forecasted earnings with invested capital (Damodaran 2010, 20-28). In the context of startups, qualitative factors, such as the management team's capability and the uniqueness of the business model, play a crucial role in forecasting potential cashflows, given the frequent lack of sufficient historical quantitative data (Rzepka et al. 2016, 319). By incorporating these qualitative aspects, the forecasts can better reflect the unique challenges and opportunities that startups face.

3.2.2 Estimation of Discount Rates

Estimating discount rates for startups involves addressing challenges related to determining the cost of equity, cost of debt, and the appropriate debt-equity ratio. Startups, often privately held, face unique difficulties in these areas. For the cost of equity, standard beta estimates from stock prices cannot be used as young firms are usually not publicly traded. Additionally, startups are often owned by undiversified investors, meaning that unsystematic risk, which typically isn't compensated in capital markets due to assumed diversification, must be factored into the cost of equity in addition to the systematic risk typically captured by the beta factor. To address this the beta can be estimated by using averages from publicly traded companies in the same sector. The unlevered beta for the sector can be calculated by removing the effects of debt, and adjustments for diversification can be made by scaling the beta to account for the lack of diversification among the firm's owners. As the company attracts more diversified investors, such as venture capitalists, the total beta can be adjusted downward, reflecting the greater diversification of these investors. Eventually, as the firm matures and possibly becomes publicly traded, the cost of equity should converge to a market beta reflecting only systematic risk (Damodaran 2010, 32-36).

3.2.3 Terminal Value

To estimate a startup's terminal value, its value at the end of the forecast period must be determined, as projecting cashflows beyond this point becomes increasingly uncertain. This terminal value often constitutes a significant portion of the business's overall value, especially for startups with small or negative cashflows in the early years. If the firm is expected to continue as a going concern, an indefinite growth of its cashflows can be assumed. In this case, the terminal value is calculated using a perpetual growth rate and the excess returns, which represent the difference between the firm's return on invested capital and its cost of capital. Alternatively, if assuming perpetual cashflows is unrealistic, such as when the firm is heavily dependent on a key person or is too small, terminal value can be estimated by determining how long the firm's cashflows will continue beyond the forecast period (Damodaran 2010, 37-41).

3.2.4 Adjustment for Survival

Evaluating a company's resilience, its capacity to endure challenging circumstances without sustaining long-term damage, is becoming increasingly important in valuations, particularly when factoring in the probability of failure and its impact on long-term sustainability (KPMG 2024, 10). Many startups fail due to competitive pressures in the marketplace. Instead of attempting to adjust the discount rate to account for this risk, a more practical approach involves two steps. First, the firm is valued under the assumption that it will survive and reach financial stability. This is typically the case when estimating terminal value and discounting future cashflows at a standard capital market-based risk-adjusted rate. Second, the likelihood of failure is incorporated by assessing the probability that the firm will not survive. Once the probability of failure is determined, the firm's value is calculated as the expected value of two scenarios: its intrinsic value assuming it survives as a going concern, and a distress sale value if it fails.

$$\begin{aligned} \text{Exp. Value} = & (\text{Value of going concern} \times (1 - \text{Probability of failure})) \\ & + (\text{Distress sale value} \times \text{Probability of failure}) \end{aligned}$$

This approach is extended across multiple periods, with a new total value recalculated for each period. As the company survives each year, the probability of survival increases, leading to an iterative growth in the firm's overall valuation. (Damodaran 2010, 41-43).

3.3 First Chicago Valuation Method

The FCM determines a company's value by estimating its earnings, cashflows, and capital structure. It further evaluates a company's value by analysing expected future cashflows under multiple scenarios, assigning probabilities to each outcome, and then weighting the values accordingly. The method typically considers three scenarios: a worst-case outcome, a base-case outcome, and a best-case outcome (Mashhadi 2023, 159-160).

3.3.1 Definition of Scenarios and Estimation of Respective Cashflows

The best-case scenario reflects a situation where the company's performance surpasses the expectations outlined in the base-case scenario, highlighting the potential upside of the investment. This scenario represents the most optimistic outlook, but not necessarily the best possible outlook. The base-case scenario, on the other hand, assumes that the company performs in line with the expectations set forth in the business plan, reflecting the anticipated range of performance. In contrast, the worst-case scenario envisions the company falling short of expectations, leading to slower growth, project delays, and higher expenses. Still also the worst-case scenario does typically not reflect the worst possible outcome. By analysing these three scenarios, a more comprehensive understanding of potential future investment outcomes can be achieved (Achleitner, Lutz 2005, 334). After defining the scenarios, the next step is to estimate the company's future cashflows over the forecast period. To do this, a thorough analysis of

historical financial statements is necessary to make informed assumptions about future growth and profitability (Mashhadi 2023, 165-166).

3.3.2 Estimation of Discount Rates

The discount rate varies based on the startup's stage and associated risk. For early-stage startups, which face higher risks, the Build-Up Method is often used, adding various risk premiums such as market, industry, size, and company-specific risks. During the growth stage, startups have likely gained traction and may be generating substantial revenue, but future growth prospects remain uncertain. A discount rate between 30% and 50% is usually applied, reflecting the remaining risk and stage of development (Mashhadi 2023, 167-168).

3.3.3 Calculation of the Terminal Value and Assigning Probabilities

In the FCM, a terminal value within five years is typically used to approximate the future cashflows the business would generate as an ongoing entity. This method relies on several assumptions to determine the terminal value, including rapid growth over the next five years reflected in cashflow projections, the ability to maintain or increase market share due to competitive advantages, and favourable long-term industry trends supporting the business model. After estimating future cashflows and determining an appropriate discount rate, the PV of these cashflows is calculated using a DCF (Discounted Cashflow) model. To derive the total enterprise value for each scenario, the PV of the terminal value is added to the PV of forecasted cashflows. The final step involves assigning probabilities to each scenario and calculating a weighted average valuation by multiplying the scenario valuations by their respective probabilities (Mashhadi 2023, 168-169).

4. Case Study: Valuation of “Too Good To Go”

4.1 Too Good To Go Business Model

TGTG is a certified Benefit Corporation founded in 2016 in Copenhagen, Denmark, with a mission to combat global food waste. It is currently in the growth startup phase. The company operates a mobile application that connects consumers with food retailers and restaurants, offering surplus food at reduced prices. Through its "Magic Bags," which contain food nearing expiration, users can purchase discounted meals that would otherwise go to waste. TGTG employs a commission-based business model, partnering with food vendors such as restaurants, bakeries, and grocery stores. These partners contribute through a dual-payment structure, consisting of a fixed annual subscription fee and variable transaction-based fees for each sale made via the app. This model ensures a steady income stream for TGTG while enabling vendors to reach an audience dedicated to reducing food waste. Acting as a digital marketplace, the app bridges the gap between consumers and vendors, simultaneously minimizing food waste and offering affordable meal options. Since its inception, TGTG has experienced remarkable growth. By 2024, the company had expanded its operations to 19 countries across Europe and North America, including Portugal, where it has been active since 2019. As of 2024, TGTG boasts over 100 million registered users and 170,000 active business partners, establishing itself as the world's largest marketplace for surplus food. The company's impact is substantial, having saved more than 350 million meals from being wasted - equivalent to preventing 891,000 tonnes of CO₂ emissions. Recognized as an industry leader, TGTG's innovative approach earned it a spot on TIME's list of Most Influential Companies in 2022, underscoring its global influence in the fight against food waste. TGTG operates in a rapidly evolving market for food waste reduction, presenting both challenges and opportunities. Among its primary challenges is navigating the competitive landscape, as similar platforms and initiatives continue to emerge. Additionally, managing operations across multiple countries introduces significant logistical

and operational complexities, particularly as the company scales its infrastructure and services. Sustaining user engagement and growing the customer base also require continuous innovation and effective marketing strategies. Despite these challenges, TGTG is well-positioned to capitalize on numerous opportunities. Rising consumer awareness and concern for environmental issues provide fertile ground for expanding its user base, as more individuals and businesses actively seek solutions to reduce food waste. Partnerships with major players in the food industry present further growth potential, enhancing TGTG's market reach and credibility. Furthermore, advancements in technology offer opportunities to improve user experience and operational efficiency, enabling the company to scale effectively while maintaining a competitive edge. These factors collectively highlight TGTG's potential to strengthen its market position and amplify its impact on reducing global food waste. Financially, TGTG has demonstrated robust performance in recent years. In 2023, the company achieved a revenue increase from DKK (Danish krone) 496 million in 2022 to DKK 545 million, alongside a gross profit of DKK 171 million. Notably, TGTG recorded its first operating profit of DKK 4.97 million in 2023, reflecting strategic operational adjustments and improved efficiency. This financial growth underscores TGTG's ability to balance its mission-driven objectives with a sustainable business model (Too Good To Go 2024). For a concise overview of TGTG's key metrics and financial highlights, please refer to [Appendix 2.1](#).

4.2 Case Study: General Approach Applied

To improve the learning process for students who might engage with the case study part of this thesis, please refer to [Appendix 1](#) depicting the Teaching Note. Prior to applying the presented valuation methods, the 2023 income statement ([Appendix 2.2](#)) and balance sheet ([Appendix 2.3](#)) of TGTG have been adjusted to reflect only the operating business. The objective of this thesis is to illustrate and discuss three different quantitative startup valuation approaches using TGTG as an example company, rather than to determine the company's actual value.

Accordingly, the income statement has been adjusted to exclude investment income that does not pertain to core operations. Consequently, the corresponding line item “other investments” on the asset side of the balance sheet has been offset with the financing debt provided by group companies. Additionally, excess cash was offset with remaining debt against group companies. Furthermore, a peergroup has been established to determine the necessary metrics for valuing TGTG. For further detail consult [Appendix 3](#). The companies included in this group operate under similar commission-based business models, providing a reliable foundation for accurately estimating relevant metrics. This ensures that the valuation is based on comparable and industry-relevant data. Throughout this thesis, the term "peergroup" refers to this established set of comparable companies. At the outset, it's important to clarify that the final objective is to determine the equity value, which in this case also corresponds to the entity value, as it is assumed that no debt is present. Please refer to [Appendix 8](#) for an overview of all formulas mentioned in this thesis.

4.3 Case Study: Venture Capital Method

Step 1: Find an Accurate Multiple and Determine the Exit Probability

To begin the valuation of TGTG using the VCM, it is essential to define the key inputs driving the analysis. The first input is the revenue estimation, which relies on the Enterprise Value/Revenue (EV/Revenue) multiple as a measure of the company's value relative to its revenue generation. For TGTG, a peergroup average EV/Revenue multiple of 3.14x is applied. This reflects typical market valuations for similar businesses operating commission-based models. The estimated revenue for TGTG in 2030 is projected based on forecasts developed in the DM to ensure consistency across methodologies. For the explicit estimation of this applied revenue please refer to [Chapter 4.4](#). Next, the exit probability is determined. Historical data and the current IPO environment suggest a success rate of 34.7% for venture-backed startups seeking an IPO (Statista 2024). This accounts for ongoing macroeconomic pressures such as high

interest rates and market volatility, which have constrained IPO activity. For TGTG, this probability reflects a realistic assumption given its growth-oriented and tech-focused business model. Finally, the venture capital target rate (which is the targeted rate of return and thus the applied discount rate) is set at 25% (Rödl & Partner 2024). This higher-than-average return expectation accounts for the elevated risks associated with investing in startups. Venture capitalists require such a premium due to the uncertainty of achieving a successful exit, as well as the high failure rates typical of early-stage companies.

Step 2: Calculate the Exit Value and its PV

With the inputs established, the next step involves calculating the company's exit value and its PV. The exit value is determined by multiplying TGTG's forecasted 2030 revenue by the EV/Revenue multiple of 3.14x. This provides an estimate of the company's valuation at the point of a successful IPO or other liquidity event. To calculate the PV of the exit value, the formula used is:

$$PV = \frac{\text{Exit Value}}{(1 + r)^t}$$

where r is the target rate (25%), reflecting the expected return for the investor and t is the investment horizon, or the number of years until the anticipated exit. This calculation discounts the future exit value back to its value in today's terms, accounting for the time value of money and the associated risks.

Step 3: Adjust for Risks and Probabilities

The final step involves adjusting the calculated PV for the probability of a successful exit. For TGTG, the exit probability is 34.7%. This means that the PV derived from the exit value is weighted by this success probability to reflect the realistic likelihood of achieving the projected outcome.

$$PV = \frac{Exit\ Value \times p}{(1 + VC\ discount\ rate)^T}$$

By combining these steps, the VCM provides the estimate of TGTG's current valuation to be DKK 230 million, reflecting both its future revenue potential and the inherent risks of the venture. This method highlights the importance of assumptions related to market conditions, target returns, and probabilities, which play a significant role in shaping the final valuation outcome. For a concise overview of the VCM valuation process, please refer to [Appendix 4](#).

4.4 Case Study: Damodaran Method

DM offers a detailed and structured valuation approach by forecasting cashflows and assessing risks comprehensively. A forecast period of seven years is chosen in the DM because the highest growth and expansion phases for TGTG are expected within this timeframe. By the end of seven years, the market is likely to have "settled," with competition and customer adoption reaching more predictable levels.

4.4.1 Top-Down Approach

Step 1: Identify the Addressable Market

To begin, the analysis defines the crucial inputs: *The Market Size*: The total addressable market for TGTG's app-based food waste management segment is projected to reach USD 0.75 billion by 2030, reflecting the potential within Europe and North America. *The Market Share*: TGTG's share is expected to increase from 15% in 2023 to 20% by 2030, driven by growing consumer awareness of food waste issues and expanded partnerships ([Appendix 5.1](#)).

Step 2: Calculate the Free Cashflow to Firm (FCFF)

The Earnings Before Interest, Taxes, Depreciation, and Amortization (EBITDA) Margin: Projected to grow from 4.07% in 2023 to 7.00% in 2030, indicating modest profitability improvements. *Reinvestment Needs*: These include depreciation and projected annual

reinvestment requirements through 2030, ensuring the company's capacity to sustain growth. For simplicity, it is assumed, that reinvestments are depreciated linearly over four years ([Appendix 5.2](#)). This formula estimates the cashflows available to the company after covering reinvestment needs for sustained growth ([Appendix 5.4](#)). The calculation of the after-tax operating income can be observed in [Appendix 5.3](#).

$$FCFF = (\text{After - Tax Operating Income}) - (\text{Reinvestment Needs})$$

Step 3: Determine the Discount Rate

The Discount Rate: The cost of equity serves as the discount rate as no debt is assumed. This case is based on a risk-free rate of 4.2% and a market risk premium of 6.2% (Statista 2024). A levered beta of 1.11 and Debt to Equity Ratio of 0.09 is derived from the peer group. Since TGTG has no long-term financial debt, the unlevered beta equals the market beta and can be calculated as:

$$\text{Market Beta} = \frac{\text{Average levered Beta}}{(1 + (1 - \text{risk free rate}) \times \text{Market Risk Premium})}$$

So that:

$$\text{Market Beta} = \frac{1.11}{(1 + (1 - 4.2\%) \times 6.2\%)} = 1.05$$

Combining these inputs:

$$r = \text{risk free rate} + (\text{Total Beta} \times \text{Market Risk Premium})$$

For example, the resulting discount rate for 2030 is calculated as:

$$r = 4.2\% + (1.05 \times 6.2\%) = 10.71\%.$$

Note, that the total beta in 2030 equals the market beta (1.05), as the company's correlation with the market is assumed to reach one by then. In earlier years, the total beta is calculated by dividing the market beta by the correlation with the market, which increases progressively over

time. As the company grows and diversifies, the total beta gradually decreases, converging to the market beta ([Appendix 5.5](#)).

Step 4: Apply Formulas for Valuation

1. Calculate Terminal Value

In this formula, g is the stable growth rate, set at 3%, slightly above the European Central Bank's inflation target of 2% and r is the discount rate, calculated as 10.71% ([Appendix 5.6](#)).

$$TV = \frac{(FCFF \text{ in } 2031) \times (1 + g)}{(r - g)}$$

2. Discount to Present Value

Both the annual FCF values and the terminal value are discounted back to their PV using the respective discount rate. Thus, the PV is calculated to be DKK 263.5 million ([Appendix 5.6](#)).

Step 5: Adjust for Survival

Finally, the analysis incorporates the probability of failure, a significant consideration for startups. For TGTG, a 40% failure probability is assumed for the current year, decreasing steadily to nearly 0% by 2030 as the company matures and becomes more stable. This adjustment refines the valuation by factoring in the likelihood of TGTG continuing as a going concern. The current value of the company is calculated by considering its intrinsic value assuming it survives as a going concern and a distress sale value if it fails. Here the distress value is assumed to be zero, so that the final value can be estimated as:

$$Final \ Value = 263,546 \times 40\% + 0 \times 60\% = 158,128$$

It is essential to highlight that this result reflects the valuation for a single year. However, the approach is designed to span multiple periods, as illustrated in [Appendix 5.7](#), with the total value being recalculated for each subsequent year. As the company successfully navigates

through each year, its likelihood of survival increases, which in turn enhances the overall valuation incrementally. This iterative process captures the dynamic nature of startup valuation, where the probability of long-term success grows with each additional year of operation, contributing to a progressively higher valuation over time.

4.5 Case Study: First Chicago Method

Unlike the DM, the FCM incorporates multiple cashflow trajectories, assessing best, worst, and most likely cases to capture a range of potential outcomes. This method allows for a more balanced and resilient valuation by accounting for various scenarios, thereby providing a more adaptable and thorough analysis that can better withstand real-world volatility. To build three distinct scenarios, specific adjustment levers were defined that vary across each scenario ([Appendix 6.1](#)). Each scenario will apply different settings to these levers to illustrate varied strategic outcomes and market conditions. To ensure consistency, the FCFF model from the DM ([Chapter 4.4](#)) is used as base for all scenarios. In all scenarios, a discount rate of 35 % is applied, following Mashhadi's approach. As TGTG is in its growth stage, it is already generating substantial revenue, however, the company still faces significant uncertainty regarding future growth prospects (Mashhadi, 2023). The PV of each scenario is estimated over a seven-year time horizon.

Step 1: Identify Key Valuation Drivers

The valuation begins with defining scenario-specific adjustment levers. Those key valuation drivers depend on the specific business model of the respective startup. In this case, the *Market Share* reflects TGTG's competitive position and growth potential. The *EBITDA Margin* measures profitability and operational efficiency, and the *Reinvestment Needs* capture the capital required for expansion or innovation. Finally, the *Stable Growth Rate* indicates long-term sustainable growth beyond the forecast period. These levers vary across the three

scenarios, representing different strategic outcomes and market conditions. To account for the high uncertainty associated with TGTG's growth-stage profile, a discount rate of 35% is applied across all scenarios. This high rate reflects the elevated risks inherent in valuing early-stage or rapidly growing startups, which face significant uncertainty in future cashflows and operational outcomes.

Step 2: Calculate Scenario Values

For each scenario, the terminal value and PV are calculated. *Best-Case Scenario*: Assumes optimistic growth with high market share, strong EBITDA margin, and minimal reinvestments. The terminal value is calculated using the formula where the stable growth rate g is set at 3% and r is 35%:

$$TV = \frac{FCFF \text{ in } 2030 \times (1 + g)}{(r - g)}$$

The PV of the terminal value and intermediate cashflows is discounted using the same 35% rate, yielding a total PV of DKK 142.8 million. *Base-Case Scenario*: Applies moderate growth assumptions consistent with the inputs used in the DM. The terminal value and PV are calculated similarly, reflecting more balanced growth projections. The PV is estimated at DKK 58.4 million. *Worst-Case Scenario*: Adopts conservative assumptions with minimal market share growth, restrained profitability (low EBITDA margin), and higher reinvestment requirements. The PV is estimated at DKK 21.4 million.

Step 3: Adjust for Risks and Probabilities

To refine the valuation, weighted probabilities are assigned to the scenarios: *Base-Case Scenario*: 70% probability, reflecting its alignment with realistic market conditions. *Best-Case Scenario*: 15% probability, representing upside potential. *Worst-Case Scenario*: 15% probability, accounting for downside risks. The weighted average of the scenario outcomes is then calculated:

Final Valuation

$$= (\text{Best} - \text{Case PV} \times 0.15) + (\text{Base} - \text{Case PV} \times 0.70) + (\text{Worst} - \text{Case PV} \times 0.15)$$

After applying the weighted probabilities to the scenario outcomes, the final valuation of TGTG is estimated at DKK 65.5 million. Please refer to [Appendix 6.2](#) to get an overview of all scenario valuation results.

4.6 Case Study: Results and Impulses for Interpretation

The valuation of TGTG was conducted using three distinct methodologies: VCM, the DM, and the FCM. Each method produced unique outputs due to its assumptions, inputs, and approach to risk adjustment. These results provide an opportunity for critical discussion on the applicability and limitations of each method in valuing startups. Please refer to [Appendix 7.1](#) to get a concise overview of all valuation results. Each method explored has specific strengths and limitations: For a compact overview of the different applied methods see [Appendix 7.2](#). To guide readers in reflecting on the implications of these methods and their outcomes, the following questions are introduced as a preparation for [Chapter 5](#). These questions encourage students and practitioners to critically engage with the methodologies, fostering a deeper understanding of the key takeaways presented in the subsequent chapter.

1. How do the three valuation methods (VCM, DM, and FCM) address risk differently? Pay particular attention to where risk is factored in.
2. Can the valuation methods be categorized into different groups? What are the key differences in their underlying assumptions and approaches?
3. What are the key critical assumptions of each valuation method, and how would the outcomes of the method change if one of these assumptions were altered?

4. Within the framework of VCM, what is the relationship between economic success and method specific factors such as exit probability and IPO success?
5. How do assumptions about survival rates influence the outcomes of the DM, and what is their impact on the overall reliability of the valuation? Specifically, to what extent are the survival rate assumptions detailed, precise, and inclusive of all critical factors affecting a startup's viability?
6. How do assumptions about scenario probabilities influence the outcomes of the FCM valuation? Do the assigned probabilities (e.g., 70% for the base case, 15% each for the best and worst cases) accurately capture TGTG's risk profile? Consider to what extent the assessments of scenario definitions might be subject to bias, and who determines the criteria for defining the cases. Further, discuss whether the worst-case scenario truly represent the most severe possible outcome.
7. Discuss the interplay between readily quantifiable factors and harder-to-determine, yet critical, variables in startup valuation. How do these elements influence the accuracy and reliability of the valuation process?

5. Key Takeaways and Guidance for Practitioners

Among the methods, the VCM yielded the highest valuation, driven by its reliance on exit multiples. The DM provided a balanced, middle-ground valuation, leveraging detailed cashflow projections and survival probability adjustments. The FCM delivered the most comprehensive valuation by incorporating multiple scenarios, capturing a range of potential outcomes. The following prompts are designed to enhance discussion and deepen understanding of these methodologies.

Understand Startup-Specific Risks: The key to startup valuation lies in addressing the risk of cashflows. This can be done by incorporating these risks directly into cashflows rather than

inflating discount rates with opaque risk premiums. This approach provides greater transparency and better reflects the startup's operational model and dynamics.

Use the Capital Asset Pricing Model (CAPM) for Cost of Capital: When valuing startups, it is recommended to use a CAPM-based discount rate derived from mature companies. This approach provides a clear and structured means to account for general market risks while maintaining transparency. Startup-specific risks, which differ significantly from those faced by mature firms, should be incorporated separately and explicitly into the cashflow projections. Techniques such as scenario analysis or survival curves are effective for addressing these unique uncertainties. Practitioners are encouraged to adopt this methodology as it separates general market risk, reflected in the CAPM discount rate, from startup-specific risks, ensuring that valuations remain both robust and comprehensible.

Leverage Monte Carlo Simulations: Monte Carlo methods model a wide range of outcomes, helping investors understand the full spectrum of risk (KPMG 2024, 12). Unlike how traditional approaches such as FCM are often implemented in practice - where equal distribution between best- and worst-case scenarios is commonly assumed - Monte Carlo simulations offer a more detailed exploration of risk, especially for startups. Monte Carlo methods can better capture startup-specific risks by reflecting skewed distributions, particularly when unfavorable outcomes are more likely. This approach provides a realistic spread of valuations and highlights the higher likelihood of lower outcomes, crucial for understanding startup risk. To maximize the effectiveness of Monte Carlo simulations, it is recommended to avoid assuming equal distributions and instead model distributions that align with the specific characteristics and uncertainties of the startup. Monte Carlo simulations also allow investors to assess a range of potential valuations instead of a single cashflow value. An exemplary Monte Carlo Simulation for this Case Study was conducted in [Appendix 7.3](#), using key valuation drivers such as *Market Share/Revenue Growth, EBITDA Margin, Reinvestment Needs, Stable Growth Rate, Discount*

Rate, and Time Horizon. These drivers align with those presented in the FCM model, with distributions assuming a slight left skewness to reflect the inherent risks and uncertainties.. The range extends from values slightly worse than the worst-case scenario to values slightly worse than the best-case scenario of the FCM. So that the value with a 50% probability of this Monte Carlo Simulation is calculated to be DKK 20.2 million. A concise overview of the Monte Carlo Simulation method can be observed in [Appendix 7.4](#).

Move Beyond Linear Models: The Monte Carlo approach provides insights by modeling a wide range of scenarios, but it relies on a linear model with fixed metric changes. This may work for mature companies but is less suitable for startups, where worst-case scenarios can alter the whole business model. This reliance on a single planning model limits its accuracy for startups. The simplest way to anticipate alternative developments is through the calculation of different scenarios, with each set of assumptions resulting in its own business plan (Kühnapfel 2015, 10). Integrating the scenario-based structure of the FCM with a more flexible modelling approach inspired by Monte Carlo can address these limitations. Distinct business models can be calculated for each scenario, with terminal values assigned probabilities to reflect risk more accurately. Investors can use right or left-skewed distributions based on their assessment of startup-specific risks.

5.1 Applying These Methods in Real-World Contexts

The challenge of applying valuation methods to real-world contexts lies not only in the methods themselves but in how uncertainty in input factors is managed. Effective valuation requires addressing key parameters explicitly, such as revenue, EBITDA margins, reinvestment rates, and other financial drivers that ultimately determine cashflow - one of the core metrics in valuation alongside capital costs and growth rates. These drivers must be modeled as uncertain variables to reflect the inherent unpredictability of real-world scenarios Sensitivity analyses can

illuminate the impact of these uncertainties, fostering a more transparent and reliable valuation process. In many cases, success lies not only in choosing a specialized method but in employing robust frameworks to represent uncertainty. Additionally, employing multiple models and moving beyond linear approaches can provide a more comprehensive and nuanced evaluation. To value startups effectively, it is crucial to address their inherent uncertainties in a structured and transparent manner. Existing valuation methods often attempt to capture startup-specific risks by adjusting both cashflows (e.g., through survival curves, scenario analysis, and IPO success probabilities) and discount rates (e.g., via risk premiums or total beta). However, this dual adjustment approach frequently introduces transparency issues, risks double-counting, and results in inconsistent or overly conservative valuations. The core question becomes: How should cashflow risk in startups be addressed? There are two main approaches: reflecting risk in the cost of capital (via the discount rate) or directly adjusting the cashflows. The latter approach is generally more effective, as it allows for a more precise representation of the startup's specific operational risks. In contrast, discount rate adjustments can be opaque, overly generalized, and challenging to justify. Valuing startups demands both analytical rigor and an appreciation of their unique uncertainties. By adopting methods that align closely with the dynamics of startups, emphasizing clarity, structure, and transparency, valuations can become more realistic and actionable. Such an approach empowers investors and stakeholders to make informed, confident decisions in the ever-evolving startup ecosystem.

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Appendix

Appendix 1: Teaching Note

Synopsis

This teaching note accompanies the case study on Too Good To Go (TGTG), a growth-stage startup combating food waste through an innovative app-based platform. The case explores TGTG's valuation challenges, applying three quantitative methods: Venture Capital Method (VCM), Damodaran Method (DM), and First Chicago Method (FCM). It emphasizes the nuances of startup valuation, the role of assumptions in shaping valuation outcomes, and provides a real-world scenario for applying these methods.

Teaching Objectives

By engaging with this case, students will:

1. Analyze the unique challenges and risks associated with startup valuation.
2. Compare and critically evaluate three distinct valuation methodologies (VCM, DM, FCM).
3. Develop analytical skills in applying theoretical valuation concepts to real-world startups.
4. Understand the interplay between quantitative data and qualitative factors in valuation.
5. Reflect on broader implications of valuation techniques in dynamic and uncertain environments.

Target Audience

This case is designed for advanced undergraduate and graduate students in finance, entrepreneurship, or business strategy courses. It is also intended for practitioners, including financial analysts, venture capitalists, startup founders, and consultants, seeking to deepen their understanding of startup valuation in dynamic environments. It is particularly suited for modules on valuation, investment analysis, or startup finance.

Teaching Plan

A detailed roadmap for a 90-minute session is provided below:

Pre-class Assignment Questions:

1. What are the key differences between valuing startups and established companies?
2. How do the VCM, DM, and FCM integrate risk into their methodologies?
3. Which assumptions are critical for each method's outcome?

Class Discussion Framework:

1. Opening Discussion (15 minutes):

- Discuss why startup valuation is inherently complex compared to established companies.
- Highlight the case of TGTG: its growth trajectory, business model, and valuation relevance.

2. Methodology Analysis (45 minutes):

VCM:

- Discuss exit value determination using the EV/Revenue multiple and IPO probabilities.
- Strengths: Simplicity and direct focus on exit.
- Limitations: Over-reliance on speculative inputs (e.g., exit probabilities).

DM:

- Analyze the detailed cashflow projections and survival adjustments.
- Strengths: Rigorous and structured approach.
- Limitations: Sensitivity to discount rate assumptions and linear projections.

FCM:

- Evaluate scenario-based flexibility and weighted outcomes.
- Strengths: Captures uncertainty through multiple scenarios.
- Limitations: Subjectivity in scenario definitions and probabilities.

3. Comparative Analysis (20 minutes):

- Contrast the simplicity of VCM with the detail of DM and flexibility of FCM.
- Explore how assumptions (e.g., market size, growth rates) impact valuations across methods.

4. Closing Discussion (10 minutes):

- Reflect on lessons learned from TGTG's valuation.
- Discuss broader implications of the methodologies for other startups and industries.

Discussion Questions

The discussion questions provided in [Chapter 4.6](#) of the thesis offer additional valuable insights and align closely with the analytical focus of this teaching note:

1. How do the methodologies address risk differently, and what are their trade-offs?
2. What are the key differences in their underlying assumptions and approaches?
3. How can sensitivity analysis improve the robustness of startup valuations?

Guided Solutions and Insights

A concise overview of all discussed valuation methods and their advantages and disadvantages can be found in [Appendix 7.2](#).

1. Handling Uncertainty:

- VCM relies on exit probabilities, while DM incorporates survival rates, and FCM uses scenario probabilities.
- Highlight the importance of clear and realistic assumptions in these adjustments.

2. Comparing Methodologies:

- VCM: Ideal for high-level, quick assessments but lacks depth.
- DM: Provides detailed insights but is vulnerable to input sensitivity.

- FCM: Balances detail and flexibility, accommodating multiple scenarios.

3. Practical Application:

- Encourage students to re-calculate valuations using alternative assumptions (e.g., varying growth rates).
- Assign exercises to explore how changing discount rates or survival probabilities alters outcomes.

Broader Implications

Valuing startups effectively requires more than selecting the right methodology; it depends on how well uncertainty in key input factors is managed. Effective valuation demands:

- *Explicit Modeling of Key Parameters:* Parameters like revenue, EBITDA margins, reinvestment rates, and cashflow drivers should be modeled as uncertain variables to reflect real-world unpredictability.
- *Sensitivity Analysis:* Sensitivity analyses are essential for understanding the impact of uncertainties on valuation outcomes, fostering a more reliable and transparent process.
- *Employing Robust Frameworks:* Using multiple models and moving beyond linear approaches enables a comprehensive evaluation that accommodates startup-specific risks and opportunities.

Recommendations

- Adjust cashflows directly for startup-specific uncertainties rather than relying solely on inflated discount rates for risk adjustment.
- Use scenario analysis (FCM) and Monte Carlo simulations to reflect the unique uncertainties of startups. Monte Carlo simulations are particularly useful for exploring a range of outcomes and highlighting the higher probability of unfavorable scenarios.

- Move beyond linear models to accommodate extreme outcomes that can disrupt business models. Combining scenario-based structures (FCM) with probabilistic distributions (Monte Carlo) yields more nuanced and actionable insights.

References and Recommended Readings

This teaching note draws on all the references used in the thesis. Key highlighted sources include:

- Damodaran, A. (2010). *The Little Book of Valuation: How to Value a Company, Pick a Stock, and Profit*.
- Mashhadi, S. (2023). "The First Chicago Valuation Method," in *A Practical Guide for Startup Valuation: An Analytic Approach*
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Appendix 2: Financial Information TGTG

1 Financial Highlights

Key Figures *in DKK'000*

Year	2023	2022
Revenue	544,985	496,193
Gross profit/loss	171,316	-40,436
Operating profit/loss	4,967	-207,481
Net financials	10,804	-3,052
Profit/loss for the year	15,716	-175,213
Total assets	516,806	275,146
Equity	46,550	30,834

Ratios

Year	2023	2022
Gross margin	31.43%	-8.15%
EBIT margin	0.91%	-41.81%
Net margin	2.88%	-35.31%
Equity ratio	43.22%	

Appendix 2.1: Financial Highlights and Key Metrics of TGTG

2 Income Statement for 2023

<i>Adjusted Income Statement</i>		<i>in DKK'000</i>	
Year	2023	2022	
Revenue	544,985	496,193	
Own work capitalised	30,240	15,412	
Cost of sales	-17,449	-4,501	
Other external expenses	-386,460	-550,314	
Gross profit/loss	171,316	-43,210	
Staff costs	-149,152	-152,831	
Depreciation, amortisation and impairment losses	-17,197	-11,440	
Operating profit/loss	4,967	-207,481	
Other financial income	779	3,653	
Other financial expenses	-775	-6,705	
Profit/loss before tax	4,971	-210,533	
Tax on profit/loss for the year	-55	35,320	
Profit/loss for the year	4,916	-175,213	
EBIT Margin	0.91%	-41.81%	
EBITDA Margin	4.07%	-39.51%	

Appendix 2.2: Adjusted Income Statement for 2023 of TGTG

3 Balance sheet at 31.12.2023*Adjusted Balance Sheet*

		<i>in DKK '000</i>	
<i>Assets</i>			
Year	2023	2022	
Completed development projects	20,022	13,275	
Acquired intangible assets	13,959	15,745	
Development projects in progress	18,099	8,888	
Intangible assets	52,080	37,908	
Other fixtures and fittings, tools and equipment	910	1,332	
Leasehold improvements	444	570	
Property, plant and equipment	1,354	1,902	
Financial assets	40,247	38,913	
Fixed assets	93,681	78,723	
Inventories	2,051	935	
Receivables	11,963	10,156	
Other investments	0	0	
Cash	0	0	
Current assets	14,014	11,091	
Assets	107,695	89,814	

		<i>in DKK '000</i>	
<i>Equity and liabilities</i>			
Year	2023	2022	
Contributed capital	51	51	
Reserve for development expenditure	29,734	19,905	
Retained earnings	16,765	10,878	
Equity	46,550	30,834	
Trade payables	18,531	21,439	
Payables to group enterprises	15,359	16,905	
Tax payable	104	195	
Other payables	27,151	20,387	
Current liabilities other than provisions	61,145	58,926	
Equity and liabilities	107,695	89,760	

Appendix 2.3: Adjusted Balance Sheet as of 31.12.2023 of TGTG

Appendix 3: Peergroup

1 Peergroup | Bloomberg

Ticker	Name	Beta:Y-1	Debt/Equity	Correlation	R-Squared	EBITDA Margin:Y (%)	EV/ Revenue Multiple
LYFT US Equity	LYFT INC-A	1.60	132.54	0.39	0.15	-7.24	9.19
ZOMATO IN Equity	ZOMATO LTD	0.82	5.44	0.27	0.07	0.35	5.39
DASH US Equity	DOORDASH INC - A	1.11	7.45	0.56	0.31	0.41	3.76
UBER US Equity	UBER TECHNOLOGIES INC	1.25	80.85	0.48	0.23	5.99	3.14
GRAB US Equity	GRAB HOLDINGS LTD - CLA	0.67	4.65	0.29	0.08	-15.85	2.35
3690 HK Equity	MEITUAN-CLASS B	1.51	26.82	0.80	0.64	7.71	1.06
DIDIY US Equity	DIDI GLOBAL INC	0.92	8.58	0.15	0.02	-0.78	0.59
Median		1.11	8.58	0.39	0.15	0.35	3.14

Appendix 4: Venture Capital Method

1 Exit Value

	<i>in DKK'000</i>
EV/Revenue Multiple	3.14
Revenue in T 7 (2030)	1,007,839
Exit Value T 7 (2030)	3,160,484

2 Present Value of Exit Value

	<i>in DKK'000</i>
Target rate	25%
Success rate	34.7%
Exit time	7
Present Value	229,992

Appendix 5: Damodaran Discounted Cashflow Method

1 Total Market

Year	2023	2024	2025	2026	2027	2028	2029	2030
Global Market Size Food Waste Management	40.41	42.75	44.91	47.19	49.57	52.08	54.72	57.49
CAGR	NA	5.06%	5.06%	5.06%	5.06%	5.06%	5.06%	5.06%
Adressable Market*	0.53	0.56	0.59	0.62	0.65	0.68	0.72	0.75

** After technological, regional and customer adaption*

2 Market Share

Market Share of "Too Good to Go"

2023 Adressable Market	0.533
2023 Revenue of "Too Good to Go" (in billion US \$)	0.081
2023 Market Share	15%

Appendix 5.1: DM - Market Share Prediction in US Dollar

3 EBITDA Margin

in DKK'000

Year	2023	2024	2025	2026	2027	2028	2029	2030
Total Market	3,566,971	3,747,460	3,937,081	4,136,297	4,345,594	4,565,481	4,796,494	5,039,197
Market Share	15%	16%	17%	17%	18%	19%	19%	20%
Revenues	544,985	597,837	654,642	715,666	781,188	851,510	926,948	1,007,839
EBITDA-Margin	4.07%	4.49%	4.90%	5.32%	5.74%	6.16%	6.58%	7.00%
EBITDA	22,164	26,818	32,110	38,102	44,863	52,470	61,002	70,549

4 Reinvestment

in DKK'000

Year	2023	2024	2025	2026	2027	2028	2029	2030
Reinvestement	30,821	25,000	20,000	15,000	15,000	15,000	15,000	15,000
Total Depreciation	17,197	23,447	28,447	34,040	18,750	16,250	15,000	15,000

Appendix 5.2: DM - EBITDA Margin and Reinvestment Needs

5 After-tax Operating Income**2023 Tax Rate of "Too Good to Go"**

Tax rate	35%
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	<i>in DKK'000</i>							
Year	2023	2024	2025	2026	2027	2028	2029	2030
EBITDA	22,164	26,818	32,110	38,102	44,863	52,470	61,002	70,549
Depreciation	17,197	23,447	28,447	34,040	18,750	16,250	15,000	15,000
EBIT	4,967	3,371	3,663	4,062	26,113	36,220	46,002	55,549
Tax	1,732	1,176	1,277	1,416	9,107	12,631	16,043	19,372
Tax-Rate	35%	35%	35%	35%	35%	35%	35%	35%
After-tax Operating Incom	3,235	2,196	2,385	2,645	17,007	23,588	29,959	36,177

Appendix 5.3: DM – After-tax Operating Income

7 Free Cashflow

in DKK'000

Year	2023	2024	2025	2026	2027	2028	2029	2030
After-tax Operating Income	3,235	2,196	2,385	2,645	17,007	23,588	29,959	36,177
Depreciation	17,197	23,447	28,447	34,040	18,750	16,250	15,000	15,000
Reinvestment	30,821	25,000	20,000	15,000	15,000	15,000	15,000	15,000
FCFF	-10,389	643	10,832	21,685	20,757	24,838	29,959	36,177

Appendix 5.4: DM – Free Cashflow Estimation

1 Market Beta

Assumptions

Risk free rate	4.20%
Market risk premium	6.20%

Market Beta

Peer group Average Beta (levered)	1.11
Peer group Average Debt to Equity Ratio	0.09
Market Beta (unlevered)	1.05

2 Cost of capital

Year	2024	2025	2026	2027	2028	2029	2030	After 2030
Market Beta	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Correlation with market	0.39	0.39	0.5	0.5	0.75	0.75	0.75	1
Total Beta	2.72	2.72	2.10	2.10	1.40	1.40	1.40	1.05
Cost of equity	21.07%	21.07%	17.21%	17.21%	12.87%	12.87%	12.87%	10.71%
Cost of capital	21.07%	21.07%	17.21%	17.21%	12.87%	12.87%	12.87%	10.71%

Appendix 5.5: DM - Estimation of Discount Rates

1 Terminal Value*in DKK'000*

Year	2031
Stable Growth rate	3.00%
FCFF 2031	44,089
Stable Cost of Capital	10.71%
Terminal Value	572,188

2 Present Value*in DKK'000*

Year	2024	2025	2026	2027	2028	2029	2030
FCFF	643	10,832	21,685	20,757	24,838	29,959	36,177
Terminal Value	-	-	-	-	-	-	572,188
Cost of capital	21.07%	21.07%	17.21%	17.21%	12.87%	12.87%	12.87%
Cumulated Cost of capital	121%	147%	172%	201%	227%	257%	290%
Present Value	531	7,391	12,623	10,308	10,928	11,678	210,088
Total PV							263,546

Appendix 5.6: DM – Estimation of Terminal Value and Present Value

3 Adjustment for Survival

End of year	Current	1	2	3	4	5	6	7
PV of Future Cashflows	263,546	263,015	309,475	356,170	399,761	446,557	477,504	572,188
Probability of failure	40%	35%	30%	25%	15%	10%	5%	0%
Value	158,128	170,960	216,633	267,127	339,797	401,902	453,629	572,188

Appendix 5.7: DM – Adjustment for Survival

Appendix 6: First Chicago Method

1 Scenario Assumptions for 2030

	Worst Case	Base Case	Best Case
Market Share/ Revenue Growth	15%	20%	30%
EBITDA Margin	5.00%	7.00%	10.00%
Reinvestments Needs	20,000	15,000	5,000
Stable Growth Rate	2.00%	3.00%	5.00%
Discount Rate	30.00%		
Time Horizon	7 years		

Appendix 6.1: FCM - Scenario Definition

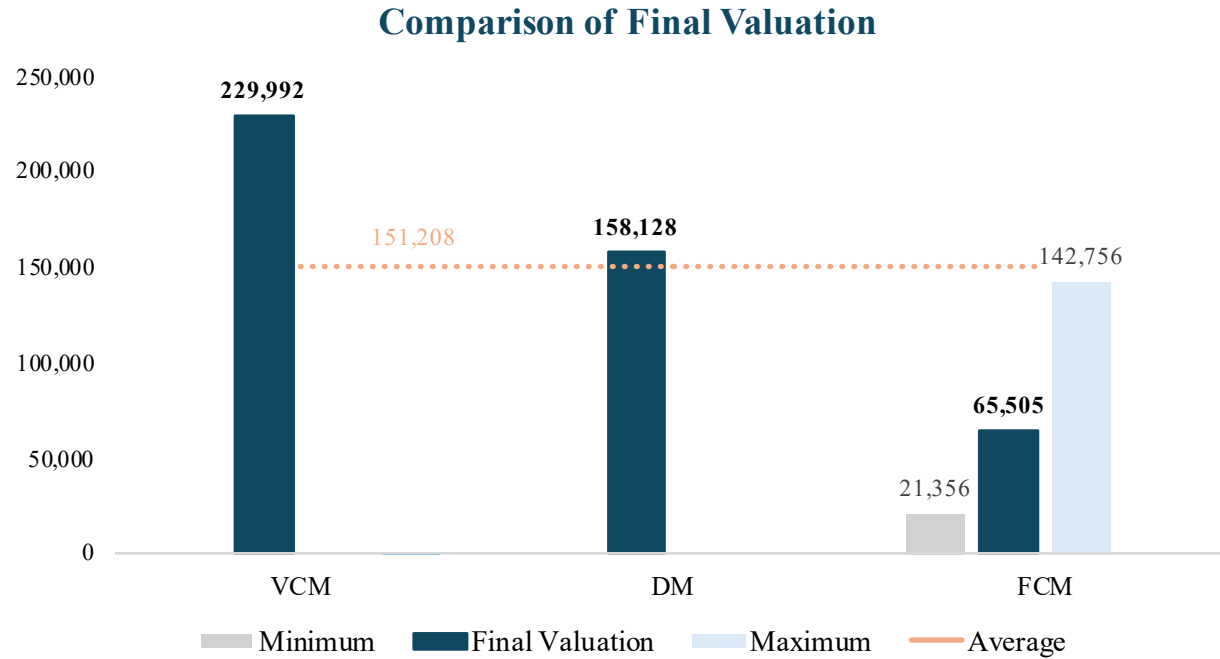
1 Scenario Probabilities*in DKK´000*

Scenario	Valuation	Probability	Final Valuation
Worst Case	21,356	15%	
Base Case	58,412	70%	
Best Case	142,756	15%	

Appendix 6.2: FCM - Final Valuation

Appendix 7: Results and Assessment

1 Comparison | Final Valuation



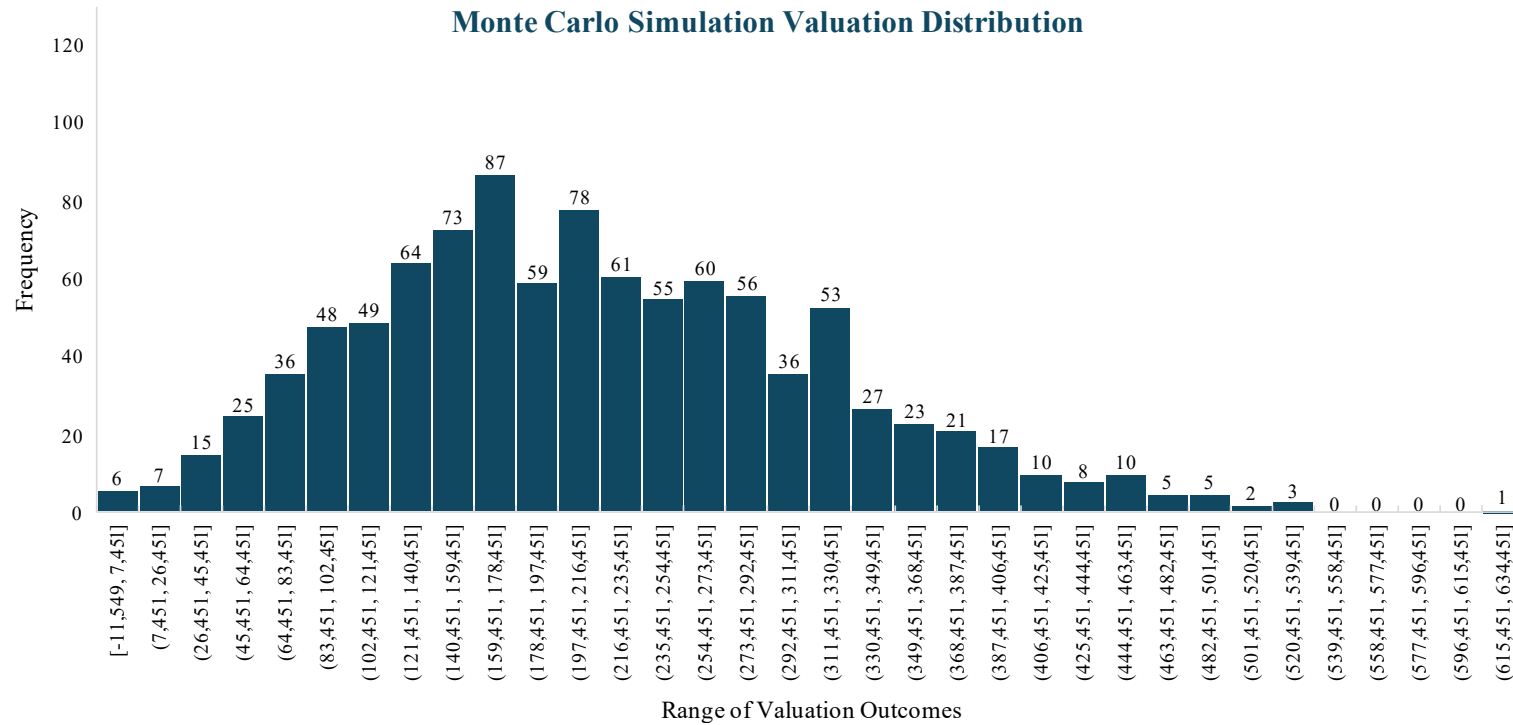
Appendix 7.1: Final Valuation – Outcome Comparison

1 Method Overview

	VCM	DM	FCM
Key Features	Focuses on capital gains at exit (e.g., IPO) with high discount rates and exit probability adjustments.	Based on detailed cashflow forecasts, discount rates, and survival probabilities over time.	Uses multiple scenarios (best-case, base-case, worst-case) and assigns probabilities to each outcome.
Advantages	Suitable for early-stage startups with a focus on exit potential. Simple, easy to communicate, and quick to apply.	Offers balanced valuation with detailed cashflow analysis, incorporating survival risks. Suitable for startups with predictable growth patterns.	Captures variability and provides a comprehensive view by integrating multiple possible outcomes. Flexible for startups facing high uncertainty.
Disadvantages	<ul style="list-style-type: none"> • Short-Term Focus and Simplified Model: Emphasizes short-term projections and terminal values, neglecting the full financial picture of a startup. • Speculative Exit Assumptions and Multiples: Relies on successful exit assumptions (e.g., IPO) and Multiples, which are influenced by market conditions rather than the startup's operational performance. • One-Size-Fits-All Risk Approach: Discount rate is not tailored to the specific business model or market position, leading to valuations that may be overly conservative or optimistic. • Empirical, Experience-Based Approach: Lacks a solid theoretical foundation, leading to variability in application across venture capital firms. 	<ul style="list-style-type: none"> • Narrow Cashflow Scenario Focus: Relies on a single, potentially biased cashflow scenario, limiting robustness and making valuations vulnerable to unexpected changes. • Contradictory Assumptions in Total Beta: Total Beta aims to evaluate non-diversified investors but presupposes full diversification, making it unreliable for startup valuation. • Lack of Cumulative Failure Risk: Calculates failure probability independently each year, ignoring the cumulative nature of risks, thereby underestimating the true fragility of startups. 	<ul style="list-style-type: none"> • Incomplete Worst-Case Reflection: Worst-case scenario often does not fully account for severe distress or outright failure, usually presenting a softened version of risks. • Equal Scenario Weighting Limitations: Assigning equal weights to scenarios can lead to an inaccurate representation of true risk exposure. • Subjective Probability Assignment: Probability weights are often subjective, which reduces the reliability of scenario analysis. • Double-Counting Risk Factors: High discount rates combined with scenario weighting can lead to risk factors being double-counted, distorting valuations.

Appendix 7.2: Valuation Method Overview

1 Monte Carlo Simulation



Appendix 7.3: Exemplary Monte Carlo Simulation for TGTG

2 Monte Carlo Simulation - Overview

Key Features	Advantages	Disadvantages
<p>Probabilistic Approach: Uses random sampling to generate a wide range of scenarios based on input variables. This allows for modeling the inherent uncertainty in startup valuations, particularly useful in highly volatile environments like startup growth.</p>	<p>Comprehensive Risk Coverage: It addresses a high degree of uncertainty by modeling various possible outcomes, including extreme conditions that may be overlooked by deterministic models like FCM.</p>	<p>Complexity in Implementation: It requires considerable computational power and advanced modeling skills, which can make its application challenging, particularly for less experienced practitioners.</p>
<p>Exploration of Scenario Distributions: It provides an in-depth look at the distribution of potential outcomes rather than a single-point estimate, thereby reflecting the full spectrum of possible results.</p>	<p>Enhanced Decision Support: By providing a distribution of outcomes, it allows investors to make decisions aligned with their risk preferences. For instance, an investor can choose a valuation corresponding to a certain percentile of likelihood based on their risk appetite.</p>	<p>Dependence on Assumptions: The accuracy of the results relies heavily on the underlying assumptions and distributions used. In the context of startups, estimating these distributions and correlations is often difficult due to the lack of reliable historical data.</p>
<p>Integration with Valuation Methods: Monte Carlo simulation can be integrated into traditional valuation approaches, like the FCM, to better capture the nonlinear risks associated with startups.</p>	<p>Realistic Scenario Distribution: Unlike equal-weighted scenario approaches, Monte Carlo simulations can model skewed distributions, where unfavorable outcomes often have higher probabilities, better capturing the typical risk profile of startups.</p>	<p>Linearity Limitation: Monte Carlo often assumes a linear model for changes in variables, which might be suitable for mature companies but less effective for startups where risks and cashflows are more nonlinear. The complexity of startups often involves genuine worst-case scenarios that change the entire business model rather than simple variations in revenue or costs.</p>

Appendix 7.4: Monte Carlo Simulation Overview

Appendix 8: Formula Sheet

VCM

PV of Exit Value

$$PV = \frac{\text{Exit Value}}{(1 + r)^t}$$

PV of Exit Value – Risk Adjusted

$$PV = \frac{\text{Exit Value} \times p}{(1 + \text{VC discount rate})^T}$$

DM

FCFF

$$FCFF = (\text{After – Tax Operating Income}) - (\text{Reinvestment Needs})$$

Market Beta

$$\text{Market Beta} = \frac{\text{Average levered Beta}}{(1 + (1 - \text{risk free rate}) \times \text{Market Risk Premium})}$$

Cost of Capital

$$r = \text{risk free rate} + (\text{Total Beta} \times \text{Market Risk Premium})$$

Terminal Value

$$TV = \frac{(\text{FCFF in 2031}) \times (1 + g)}{(r - g)}$$

Firm Value – Adjusted for Survival

$$\begin{aligned} \text{Exp. Value} &= (\text{Value of going concern} \times (1 - \text{Probability of failure})) \\ &+ (\text{Distress sale value} \times \text{Probability of failure}) \end{aligned}$$

FCM

Terminal Value

$$TV = \frac{FCFF \text{ in } 2030 \times (1 + g)}{(r - g)}$$

Final Valuation – Weighted Scenarios

Final Valuation

$$\begin{aligned} &= (\text{Best – Case PV} \times 0.15) + (\text{Base – Case PV} \times 0.70) + (\text{Worst} \\ &\text{– Case PV} \times 0.15) \end{aligned}$$