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DISCOUNTED CASH FLOW (DCF) VALUATION OF A MULTINATIONAL COMPANY – A CASE STUDY OF PUMA SE

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ABSTRACT

Valuation is a central discipline in finance, with the Discounted Cash Flow (DCF) approach sometimes referred to as the “gold standard”. Despite extensive literature on DCF valuation, few studies explicitly tackle the complexities of extending this method to multinational enterprises (MNEs), which are increasingly influential. This master's thesis aims to fill this gap by applying the DCF valuation to the MNE "Puma SE", presenting these challenges in practice and providing solutions for them. The findings emphasize the need to accurately incorporate the unique characteristics of an MNE into the valuation model, considering the data availability. This involves, among others, a balanced use of aggregated and disaggregated free cash flows to the firm (FCFF) forecast, a careful selection of the length of the forecasting period and a precise estimation of the cost of equity. The overall DCF analysis for Puma SE indicates a slight undervaluation by the market as of 31.12.2023.

Keywords: Company valuation; Multinational enterprise (MNE); Discounted Cash Flow (DCF); Puma SE

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LIST OF ABBREVIATIONS

APV	Adjusted Present Value
APT	Arbitrage Pricing Theory
B2B	Business-to-business
CAPM	Capital Asset Pricing Model
CAPEX	Capital expenditure
CRP	Country risk premium
D&A	Depreciation and amortization
DCF	Discounted Cash Flow
DTC	Direct-to-consumer
EBIT	Earnings before Interest and Taxes
EBITDA	Earnings before interest, taxes and depreciation and amortization
EV	Enterprise value
FCFF	Free cash flow to the firm
IFRS	International Financial Reporting Standards
M&A	Mergers & Acquisition
MNE	Multinational enterprise
MV	Market value
NCNWC	Non-cash net working capital
NOPAT	Net operating profit after taxes
OPEX	Other operational expenses
P&L	Profit and Loss
P/E	Price-earnings ratio
R&D	Research and development
ROIC	Return on invested capital
RRP	Regional risk premium
S&P	Standard & Poor's
SDG	Sustainable development goal
WACC	Weighted average Cost of Capital

1. INTRODUCTION

1.1. Presentation of the topic

Company valuation is the process of determining a company's value, which refers to the utility an individual gains from ownership, comprising future financial and non-financial benefits (Muenstermann, 1970). It occupies a central place in finance, often being described as constituting its "heart" (Damodaran, 2006). Due to its critical importance across a wide array of applications, including company buying and selling operations, strategic planning, and the identification of key value drivers, valuation is an indispensable component of financial decision-making for companies, investors, creditors, and regulatory authorities alike (Fernandez, 2007; Coenenberg et al., 2002). The Discounted Cash Flow (DCF) method is widely regarded as the "gold standard" of valuation (Damodaran, 2006; Misamore, 2022). However, accurately valuing a company using the DCF valuation in practice can be very challenging, especially for entities that operate across diverse markets and segments due to heightened risk profiles, complex holding structures and their multi-business and market presence, among other things (Damodaran, 2009a). As the world economy is becoming more integrated, the number as well as the significance of such multinational enterprises (MNE) is on the rise (Rakhimova, et al., 2020). Additionally, their increasing engagement in mergers & acquisitions (M&As), driven by globalization and the development of capital markets, underscores the growing importance of valuing multinational companies precisely (Kramna, 2014).

1.2. Research objectives

While there is a rich body of academic literature offering a wide range of studies and articles focused on discounted cash flow valuation and multinational firms and their characteristics, there are very few research studies that combine these two topics and explicitly deal with the DCF valuation of multinational companies. Some of the most notable works on this topic are single chapters of books or articles by authors such as Damodaran (2009a). This master's thesis aims to fill this gap by providing a through exploration of multinational company DCF valuation, structured around three core objectives:

firstly, by investigating the unique DCF valuation challenges faced by MNEs as opposed to domestic single-business firms; secondly, by demonstrating these challenges in practice through the DCF valuation of the German multinational sporting goods company Puma SE and proposing solutions for them; and thirdly, by offering a practical DCF valuation framework through the development of a comprehensive Excel valuation model applied to Puma SE. This master's thesis indirectly helps to accomplish sustainable development goal (SDG) 4 by enhancing financial education, providing investors with the knowledge needed to conduct accurate DCF valuations. By doing so, the research helps to mitigate speculative trading and market bubbles, thus also supporting sustainable economic growth in line with SDG 8 (United Nations, 2024).

1.3. Structure

In order to achieve these research objectives, a structured approach is followed, beginning with a comprehensive literature review. This initial section aims to provide the reader with an overview of the main valuation method employed in this thesis, the DCF valuation (chapter 2.1), in particular the Free Cash Flow to the Firm (FCFF) approach. While there are several other valuation techniques available—such as relative valuation, asset-based valuation, and contingent claim valuation—these methods are not explored in any detail within this thesis due to page

constraints and to ensure a focused, in-depth analysis of the DCF approach (Fernandez, 2002). However, the relative valuation technique is applied later in the analysis (specifically in chapter 4.7) to provide context and enhance the interpretation of the DCF-derived results. After having a general understanding about DCF valuation under the premise of evaluating a single business domestic company, the focus then shifts towards multinational companies (chapter 2.2), starting off by highlighting how their characteristics differ from those of businesses operating within single markets and businesses. Combining, both the acquired knowledge about DCF valuation and the unique characteristics of MNEs, the DCF valuation approach is then extended to the multinational context in chapter 2.3 and the theoretical challenges of implementing the DCF valuation method for these entities are examined. In the methodology section (chapter 3) the selection of Puma SE as a case study, its business model and the data collection process, that involves both the collection of quantitative and qualitative data to make well-justified assumptions about future developments, are explained. Armed with the requisite data and theoretical framework, the subsequent chapter 4, after providing a general overview on the sporting goods industry in which Puma operates and answering fundamental DCF forecasting questions, applies the DCF valuation method to Puma SE and offers practical solutions for the challenges previously identified. To better understand the DCF valuation results, they are compared with the relative valuation method (chapter 4.7) and Puma's actual share prices (chapter 4.8), followed by a sensitivity analysis (chapter 4.9). The final chapter 5 presents the main findings, divided in theoretical and practical implications, and discusses the limitations, and potential areas for future research.

2. LITERATURE REVIEW

2.1. Discounted Cash Flow (DCF) valuation

2.1.1. Fundamentals

Discounted Cash Flow (DCF) valuation is a widely used approach for determining a company's value and forms the basis for other valuation models such as the relative valuation (Damodaran, 2002; Erb, 2020). As an intrinsic valuation method, it focuses on valuing the firm by calculating the present value of the expected future cash flows that a company will generate over its lifetime (Damodaran, 2009a; Schmidlin, 2014).

In the practice, these cash flows are typically forecasted in detail only for a specific period. Beyond the detailed planning period, it becomes impractical to estimate cash flows with a high degree of accuracy, so a terminal value is computed instead, which captures all future cash flows beyond this point into perpetuity (Fernandez, 2002; Schmidlin, 2014). To obtain the present value of the predicted future cash flows, the cash flows are converted to their current monetary value at the time of the valuation using an appropriate discount rate. This rate should reflect both the risk associated with the investment and the inherent time value of money, to enable, for instance, a direct comparison between the present value of the (equity) cash flows and the current market capitalization of a publicly traded company (Cirman et al., 2011; Schmidlin, 2014). While various DCF models exist, they mainly differ in two key aspects: the specific cash flows and the discount rates used, depending on whether the entire business or just the equity stake is valued (Damodaran, 2002; Drukarczyk et al., 2021; Meitner, 2006).

For whole business valuation, the free cash flow to the firm (FCFF) available to both shareholders and creditors, discounted at a rate that reflects all financing costs of the company, is used. In contrast, equity valuation focuses on cash flows available to shareholders after debt expenses, applying only the cost of equity as discount factor (Dluhosova, 2005; Koller et al., 2020). Since the firm value can be converted to the equity value, the primary focus in this thesis is on the DCF model valuing the entire firm using the FCFF approach. While there is also an alternative approach to value the entire firm, known as Adjusted Present Value (APV), it is not considered in this thesis due to its lesser practical relevance and the fact that, when correctly implemented, it yields to the same results to those of the FCFF method (Damodaran, 2002).

2.1.2. Free Cash Flow to the Firm (FCFF) approach

The FCFF is the after-tax cash flow available for distribution to all investors, calculated as Net Operating Profit After Taxes (NOPAT) plus non-cash operating expenses minus non-cash operating revenues and reinvestment needs, as presented in *Figure 1* below (Titman et al., 2011). The NOPAT, reflecting the earnings generated from core business activities without the influence of debt financing, can be defined as Earnings before Interests and Taxes (EBIT) after taxes (Koller et al., 2020). Non-cash operating expenses, such as increases in pension provisions, are added back because, although they reduce the EBIT, they do not involve actual cash outflows, while non-cash operating revenues have to be subtracted as they increase the EBIT but do not represent a cash inflow (Schmidlin, 2014). Reinvestment needs, which typically do not impact the EBIT but decrease available cash to investors apart from the depreciation and amortization (D&A), must be subtracted (Koller et al., 2020; Damodaran, 2002). The first component of the reinvestments needs includes net capital expenditures, defined as investments in fixed assets minus depreciation and amortization, which are essential for maintaining existing assets and thus, the company’s productive capacity or for fostering future growth (Abascal, 2012; Damodaran, 2002). The second component involves investments in non-cash net working capital (NCNWC). Due to the variability of terms and occasional confusion in the literature, it is important to clarify that in this context, non-cash net working capital includes all operating current assets—such as receivables and inventory—excluding cash and marketable securities, minus operating current liabilities, which are related to the company's day-to-day activities (Abascal, 2012). Interest-bearing liabilities are excluded from this calculation as they are considered separately when calculating the cost of capital to avoid double-counting (Damodaran, 2002; Koller et al., 2020).

Figure 1: Free cash flow to the firm (FCFF) breakdown

Equals (=)	Earnings before Interests and Taxes (EBIT)	
Less (-)	Income taxes	
Equals (=)	Net Operating Profit After Taxes (NOPAT)	
Add (+)	Non-cash operating expenses (excluding D&A, which are considered below)	
Less (-)	Non-cash operating revenues	
Less (-)	Capital expenditure (CAPEX)	} Reinvestment needs
Add (+)	Depreciation & amortization (D&A)	
Less (-)	Increases in non-cash net working capital (NCNWC)	
Equals (=)	Free cash flow to the firm (FCFF)	

Source: Own elaboration based on Damodaran’s (2002) and Titman’s (2011) definition

Understanding the components of the FCFF is crucial, as it sets the stage for the next step in valuation: forecasting these parameters. The duration of the detailed forecasting period, usually ranging from 5 to 10 years, depends on the company’s stability and the dynamics of the market it operates in. A stable, mature company might require only a short forecast period, whereas a company experiencing significant changes or growth may necessitate a more extended forecasting period to accurately capture its evolving financial landscape (Koller et al., 2020; Schmidlin, 2014).

While the calculation of the present value of the future FCFF is straightforward once the future cash flows and the appropriate discount rate are determined, the precise estimation of these parameters over the planning period proves difficult as it involves making assumptions about an uncertain future. Moreover, it is crucial to recognize that the various components of the FCFF interact significantly with each other. This interaction necessitates a detailed and integrated approach that includes linking the income statement and balance sheet to ensure the most accurate forecasts for the planning horizon (Koller et al., 2020). Given the complexity of such an integrated forecast, strategically reorganizing the financial statements to focus on major figures becomes crucial (Abascal, 2012). The starting point for such a forecast is typically a detailed analysis of the past financial data of the company being valued. This analysis aims to identify recurring factors, key value drivers and trends that could influence future outcomes and to develop ratios for different line items that may be useful for future forecasts (Koller et al., 2020; Drukarczyk et al., 2021). However, solely relying on past financial without taking into account the company’s future strategy, potential market trends, external opportunities and threats could result in a biased forecast. Therefore, it is also essential to analyze the market environment of the company, its competitors, opinions of industry experts and a wide array of different sources to obtain a well-rounded view (Drukarczyk et al., 2021).

Since predicting the FCFF in detail indefinitely is impractical due to increasing uncertainty, lack of long-term data relevance and the practical limits of strategic forecasting, the terminal value discounted to today's value is used to capture the firm's value beyond the planning period. However, the terminal value should only be calculated once the business operations have reached a steady state, ensuring that all value drivers in the financial projections would remain constant and predictable (Damodaran, 2002; Drukarczyk et al., 2021). As the terminal value constitutes a major part of the present value of cash flows, a good estimate of this value is crucial. Among the three models available for estimating the terminal value—the liquidation value, the multiple approach, and the stable growth model—the stable growth model is deemed most suitable for ongoing businesses (like Puma), given the limitations of the other models (Damodaran, 2002).

In the stable growth model, it's assumed that the free cash flows to the firm will grow at a constant rate into perpetuity. This model calculates the terminal value at the end of the planning period n with the formula:

$$\text{Terminal value at } n = \frac{FCFF_{n+1}}{(\text{Cost of capital} - \text{growth rate } g)}$$

In this formula, the growth rate g is a critical component, as it significantly impacts the final valuation of the firm, and perhaps the most challenging to estimate accurately (Damodaran,

2002). For a company to maintain a steady growth rate, it must make reinvestments that not only sustain its operations but also enhance its competitive advantage, thereby yielding returns that exceed the overall cost of capital (Damodaran, 2002; Drukarczyk et al., 2021). Hence, the two primary drivers of growth are the future reinvestments made into the business and the returns generated from these investments. Consequently, one way to estimate the expected growth rate g in the operating income (EBIT) is by calculating the product of the reinvestment rate and the return on these reinvestments, sometimes referred to as return on invested capital (ROIC) (Damodaran, 2002; Koller et al., 2020). The reinvestment rate is determined by dividing the previously introduced reinvestment needs by the NOPAT. The return on invested capital is calculated by dividing the NOPAT of the current year by the capital invested in the business the previous year. The capital invested is typically represented by the book value of debt and equity subtracting the cash (Damodaran, 2009a).

It is important to critically question the overall result obtained from this calculation for the growth rate as it is based on the assumption that reinvestment rates and returns remain constant indefinitely—a scenario unlikely in a dynamic economic environment. Additionally, it should be ensured that the stable growth rate is not exceeding the growth rate of the economy in which the company operates since this would not be realistic (Lopez, 2008). Some authors, such as Damodaran (2002), further advises that the stable growth rate should not exceed the risk-free rate (*explained on page 10*) used in the valuation.

Once, the growth rate g is estimated, the free cash flow to the firm at $n+1$ can be calculated, which involves taking the forecasted operating income at time n , adjusting it by the tax rate, subtracting the reinvestment rate, and factoring in the growth rate g . This free cash flow is expected to grow by g forever and is therefore divided by g minus the cost of capital, to balance the expected growth against the overall investment risk. As the terminal value only reflects the company value at $t=n$, it is essential to discount it back to its present value to be able to integrate it into the total valuation of the company (Damodaran, 2002; Fernandez, 2002).

So far, the analysis has primarily focused on the first key variable in the FCF model: the free cash flows to the firm. However, the second critical variable, the cost of capital used as the discount rate, still needs to be determined. First, it's important to understand that regardless the name “cost of capital”, it isn't a direct financial cost but rather represents an opportunity cost—reflecting the potential returns an investor could have realized by placing their capital in other investments of similar risk levels. Thus, the cost of capital effectively quantifies the expected return required by both lenders and equity holders, tailored to the risk associated with the firm (Koller et al., 2020). The greater the uncertainty about the projected cash flows, the higher the appropriate discount rate and the lower the present value of the FCF (Schmidlin, 2014). In practice, the Weighted Average Cost of Capital (WACC) is most commonly used to quantify this cost, effectively blending the costs associated with both equity and debt, weighted according to the firm's capital structure (Koller et al., 2020).

Estimating the cost of equity is particularly challenging because it involves determining the opportunity cost for shareholders, reflecting the return they would expect to earn from other investments carrying similar risk (Pratt, 2002; Titman et al., 2011). This complexity arises because the risk to equity investors is inherently higher than that to debt lenders, since equity

returns depend on the company's profitability and are not legally required as opposed to debt payments. Consequently, calculating the cost of equity demands incorporating more assumptions and a detailed analysis of both market conditions and company-specific risks (Abascal, 2012). Among the various methods available to determine the cost of equity, the Capital Asset Pricing Model (CAPM) remains the most prevalent, despite its limitations and the criticism it faces from both academics and practitioners (Graham, 2022; Levy, 2010; Koller et al., 2020). According to the model, the cost of equity can be estimated by the risk-free rate plus the levered beta (β) multiplied with the equity or market risk premium. Hence, it comprises two main components, the risk-free rate, representing the time value of money, and a risk premium reflecting the specific risk of the company being valued, as seen in the formula below (Berk et al., 2014).

$$\text{Estimated cost of equity} = \text{risk-free rate} + \underbrace{\beta * \text{Equity risk premium (ERP)}}_{\text{Firm-specific risk}}$$

Risk in this model can be understood as the variability or deviation of the actual returns of an investment from the expected returns. The risk-free rate serves as the baseline return that an investor would expect from an absolutely safe investment, where the actual return is always equivalent to the expected return, thereby eliminating any default or reinvestment risk (Damodaran, 2002). Government bond returns are typically used to estimate the risk-free rate, as they are assumed to have no default risk. However, it is crucial to ensure that this rate aligns with the maturity and the currency of the cash flows of the company being valued. For example, if a valuation involves long-term investments and the expected returns are calculated in U.S. dollars, then the yield on a ten-year U.S. Treasury bond is commonly employed as the risk-free rate (Damodaran, 2002; Koller et al., 2020).

The second component, the risk premium, can be broken down into two, a systematic risk or non-diversifiable risk, the (levered) beta and the equity or market risk premium (Damodaran, 2002; Koller et al., 2020). The beta represents the sensitivity of a company's stock return relative to the overall market movements. It is particularly relevant for publicly listed companies as it is based on market prices and calculated through the covariance of the company's returns with the market returns divided by the variance of the market returns (Berk et al., 2014). A beta greater than 1 indicates that the stock is more volatile than the market, while a beta less than 1 reflects the opposite. When a company is owning debt, the additional risk from this leverage for the shareholder must be incorporated into the beta, resulting in what is known as levered beta, which adjusts for the debt-to-equity ratio of the company (Fernandez, 2002). A historical beta, typically derived from monthly or weekly data over the past 5 to 10 years, is often used to estimate the future beta of a company. However, due to the potential imprecision of a single company measurement, many practitioners opt for an industry beta derived from a set of peer companies to better estimate the systematic risk for the entire industry (Koller et al., 2020).

The equity risk premium (ERP) is a critical measure that represents the additional return investors demand for investing in the market index compared to a risk-free asset (Damodaran, 2002). When it comes to determining the expected market return over the forecasting period, historical data, as seen before for the beta, offers a practical starting point. Specifically, the historical average annual return of the stock market, as represented by a stock market index over the last ten years or across a complete market cycle including both its up and down phases,

provides valuable insights (Abascal, 2012). To calculate the market risk premium, the risk-free rate established earlier is subtracted from this historical average annual market return, ensuring that the valuation results are coherent (Damodaran, 2002).

It's essential to recognize that the standard market risk premium typically reflects the additional expected return from investing in stable, developed markets. However, for investments in regions with higher risk profiles—such as emerging or less developed markets—it is necessary to incorporate an additional country risk premium (CRP). The CRP addresses the elevated risk associated with these markets compared to more developed ones. The CRP is typically obtained by multiplying the default spread on sovereign bonds issued by the country with the equity market volatility to measure the extra yield that investors demand for taking on equity risks in these potentially unstable regions (Damodaran, 2002; Damodaran, 2009b).

Combining the base premium for a mature equity market and the CRP, the ERP effectively measures the total extra return required by investors to compensate for both general market and specific country risks (Damodaran, 2002; Damodaran, 2009b). Once all components according to the CAPM are determined, the cost of equity can be estimated.

The second component of the WACC formula, the cost of debt represents the expected return that lenders demand for their investments (Damodaran, 2002). This cost can be quantified by adding a default spread for the company being valued to the risk-free rate and adjusting for the tax benefits derived from the tax-deductibility of interest expenses (Damodaran, 2009a). While the risk-free rate was discussed earlier, the default spread is typically determined by the credit ratings assigned to the valued company by agencies like Standard & Poor's (S&P), Moody's, and Fitch (Damodaran, 2002). The cost of debt is further adjusted by multiplying it by (1 - the marginal tax rate). The marginal tax rate, applicable to the last unit of currency of income and depending on the prevailing tax code, is used because interest expenses generate tax savings at this marginal level, thus reflecting the actual tax impact on incremental earnings (Damodaran, 2002; Koller et al, 2020). However, determining the precise marginal tax rate throughout the projection period can be challenging. As a simplified approximation, the corporate or effective tax rate is commonly employed in practice (Lee et al., 2019).

To accurately determine the total cost of capital using the WACC formula, as shown below, it's essential to weight the costs of equity and debt according to their proportions in the firm's capital structure. These weights should be based on the market values (MV) of equity and debt, as these provide the most current and relevant assessment of how the firm is financed (Damodaran, 2002).

$$WACC = \frac{MV\ DEBT}{MV\ DEBT + MV\ Equity} \times \text{after-tax cost of debt} + \frac{MV\ Equity}{MV\ Debt + MV\ Equity} \times \text{cost of equity}$$

However, due to the complexity of obtaining market valuations, especially for certain types of debt, book values are often utilized in practice as best estimate for market values (Abascal, 2012). While theoretically, the WACC should also be adjusted frequently to reflect changes during the forecasting period in marginal tax rates, interest expenses, debt levels, and beta risk, in practice, this is often deemed impractical due to the significant resource demands and the need for continuous data updates (Fernandez, 2011). Once established, the WACC is used as the discount

factor for the future free cash flows to the firm to determine their present value, as stated in the formula below, which equates to the enterprise value of the company.

$$Enterprise\ value = \sum_{t=1}^{t=n} \frac{FCFF_t}{(1 + WACC)^t} + \frac{Terminal\ value_n}{(1 + WACC)^n}$$

To derive the equity value from the enterprise value, the following steps, as presented in *Figure 2* below, have to be undertaken.

Figure 2: Enterprise to equity value bridge

↓	Equals (=)	Enterprise value
	Less (-)	Debt
	Less (-)	Other non-equity claims
	Add (+)	Cash & marketable securities
	Add (+)	Other non-operating assets
↓	Equals (=)	Equity value

Source: Own elaboration based on Damodaran's (2002) definition

To find the value per share, the equity value is then divided by the number of shares outstanding at the valuation date (Koller et al., 2020; Damodaran, 2002).

2.2. Characteristics of multinational companies

Up to this point, the DCF framework has been introduced with a focus on establishing a general understanding of DCF valuation without addressing the additional complexities that arise when applying this valuation method to MNEs. Such complexities stem from the unique characteristics of MNEs, which are examined in the following.

As implied by the name, MNEs are corporations with operations across multiple nations, engaging in cross-border transactions that encompass production, sourcing, marketing, and sales of goods and services in diverse international markets, characterized by varying customers and consumer preferences, economic conditions, currencies and regulatory frameworks, among other things (Damodaran, 2009a; Ernst et. al, 2012; Dunning et a., 2008). In order to successfully deal with the diverse market needs, MNEs typically establish subsidiaries, branches, or joint ventures in several countries, which results in complex holding structures. These decentralized entities, despite their autonomy, are coordinated by a centralized headquarter, ensuring that the company's global strategy is consistently implemented while also allowing for adaptations to local preferences. The detailed management style and degree of control employed by the central headquarters can vary significantly among different MNEs. In contrast, domestic companies focus their activities inside their own borders, navigating a single economic, cultural, and legal environment (Damodaran, 2009a; Dunning et a., 2008)

Furthermore, MNEs frequently operate across multiple business segments requiring detailed knowledge not only about diverse markets but also across different industries (Damodaran, 2009a).

While MNEs can benefit from cost optimization and efficiency gains due to economies of scale and scope from global sourcing and operations in multiple countries, they might suffer apart from the above-mentioned rise in complexity from an exposure to a broader spectrum of risks.

MNEs are vulnerable to geopolitical uncertainties, currency exchange rate fluctuations, changes in international trade laws, and differences in industry growth and market conditions across multiple regions. Although it is often stated that geographic and market diversification decreases a company's overall risk through risk spreading, this principle does not uniformly apply to operations in highly volatile and correlated emerging markets, where the instability and unpredictability can substantially offset the risk reduction benefits expected from diversification. However, the attraction of emerging markets, especially in Asia and Latin America, remains strong for European and American MNEs as these regions' present unique growth opportunities, driven by dynamic economic environments, rapidly expanding consumer bases, and increasing integration into the global economy, despite the potential risks (Damodaran, 2009a; Damodaran, 2009b; Dunning et al., 2008).

2.3. Challenges in the DCF Valuation of multinational companies

While the fundamental methodology and input factors of the FCFF approach remain consistent, applying it to an MNE introduces a higher degree of complexity due to the unique characteristics of such entities, which pose many more estimation challenges when calculating the main FCFF parameters (Damodaran, 2009a).

Firstly, the operations of an MNE, spanning multiple countries and business segments introduce significant variability in revenues, costs, profits, investment needs, and non-cash net working capital requirements, as these factors might vary strongly between different segments and countries. To achieve an accurate projection of future free cash flows to the firm, it would be advisable to conduct forecasts at the both segment and country level. Further refining the forecast within individual segments, and also incorporating, for instance, the respective distribution channel, can enhance precision. However, this disaggregated approach presents substantial challenges. Not only does it considerably increase the complexity of forecasting and demands much deeper knowledge of each specific market and segment compared to an aggregated company-wide forecast, but it also often impractical due to the limited availability of financial data segmented by business line and region. MNEs commonly provide financial breakdowns only by region—often grouping multiple countries together— or by business segment, but not a detailed matrix breakdown by both business and region for the relevant FCFF parameters. To at least account for differences at regional or business segment level, the FCFF forecast should be made on either these two levels. However, the lack of information about future plans for all FCFF parameters at region or segment level provided by an MNE and the allocation of significant centralized costs—such as administrative expenses from headquarters—bring in another level of complexity. Centralized costs must be distributed across different segments or countries, yet the basis for such allocations can be ambiguous and subject to debate. Therefore, any earnings measures, such as EBITDA, calculated at a divisional or regional level, may be questionable due to potentially inaccurate allocation of headquarters' costs (Damodaran, 2009a).

Additionally, the multinational scope of an MNE requires critical decisions regarding the choice of currency for financial forecasting, as the company generates cash flows in multiple currencies. Selecting a particular currency impacts the corresponding risk-free rates, thereby influencing the cost of equity and cost of debt, which vary across different currencies. Once a currency is chosen, another significant challenge arises: managing the currency volatility associated with

consolidating future overseas earnings and free cash flows into the parent company's financial statements. Furthermore, the global net income generation by an MNE necessitates the careful consideration and appropriate weighting of diverse tax rates across countries, in order to accurately projecting the company's future free cash flows after taxes and estimating the after-tax costs of debt (Damodaran, 2009a).

Not only the calculation of the FCFF during the planning period but also the estimation of the terminal value at the end of that period is particularly complex in an MNE context. Even the fundamental assumption underlying the application of the terminal value concept—that the business will reach a steady state by the end of the forecast period—is often more difficult to validate in an MNE, as there might be significant differences in growth momentum among different businesses and regions within the enterprise. This variability may necessitate a longer and more detailed forecasting period and/or the calculation of multiple growth rates to accurately reflect the diverse operational contexts within the MNE (Damodaran, 2009a). However, the lack of detailed segment-specific and regional information about reinvestment rates and return on capital required for estimating multiple growth rates, as mentioned in point 2.1.2., makes the determination challenging and highly subjective in practice. Once a singular growth rate has been determined or multiple growth rates have been aggregated, it is critical to ensure that the overall assumed growth rate does not surpass the expected GDP growth of the countries or regions in which the company operates. The global scope and the lack of detailed knowledge about the operating countries and regions of an MNE, as well as long-term country and regional GDP growth rates, complicate the determination of an accurately weighted long-term GDP growth rate for the specific company.

In addition to the complexities involved in forecasting future cash flows for MNEs, their global presence also exposes them, as highlighted in point 2.2., to a broader array of risks. These risks must be considered when determining the cost of capital, particularly the cost of equity. The varied risk profiles of different countries, especially those that are highly volatile, such as emerging markets, necessitate the inclusion of multiple CRPs in the market risk premium. Ideally, each CRP should be weighted according to the revenue generated in each corresponding country. However, as mentioned above, this information is usually only available on regional rather than a country-specific basis, complicating the accurate calculation of a weighted average of CRPs for the use in the discount rate (Damodaran, 2009a). Furthermore, there is the question, of which revenue figures, if even available in detail, should be used for weighting—whether it should be the figures from the past year, an average of the last five years or also including future revenue expectations.

Similar challenges arise from the fact that an MNE operates not only across multiple countries but also across diverse business segments, which necessitates to consider multiple (unlevered) betas for each segment to accurately assess the systematic risk of the company. This process involves not only selecting appropriate peer companies within the same businesses but also calculating each segment's unlevered beta by assuming an average industry capital structure and income tax rate. Once the unlevered betas are determined, the next step involves re-levering each beta according to the specific debt-to-equity ratio and tax rate of each segment. However, companies often do not disclose the debt-to-equity ratios or tax rates at segment level, which

requires further assumptions. Finally, to compute a single consolidated (levered) beta for the entire MNE, the individual segment betas must be aggregated. This aggregation is typically done by weighting each beta according to the revenue or operating income contributed by each segment, but, as with the CRPS, the question of the exact figures to be used remains open.

It is crucial to note that these weights are also subject to change based on the business development and market dynamics affecting each segment and market over the planning period, potentially altering the company's overall risk profile over time. Therefore, the cost of capital for an MNE should reflect the mix of businesses and markets that it currently operates in, as well as potential changes going forward (Damodaran, 2009a).

3. METHODOLOGY

3.1. Research design and case description of Puma SE

As a practically oriented master's thesis, this work aims to translate the theoretical challenges, discussed in point 2.3., into practice and develop pragmatic solutions for them. Therefore, a case study is conducted in which the FCFE approach is applied to the real-world company Puma SE. The choice of Puma SE as a case study is based on its substantial, although sometimes overlooked and underexplored, position in the sporting goods industry. Living in the shadow of Adidas, its more established and bigger rival, Puma has shown remarkable financial success. This was especially evident in the two most recent fiscal years, 2022 and 2023, in which Puma achieved a higher net income than Adidas despite generating revenues that were more than 2.5 times lower (Magenheim, 2023; Puma SE, 2023a; Adidas AG, 2023). Additionally, Puma serves as an ideal example of an MNE, fulfilling all its important characteristics.

Puma, founded in 1948 by Rudolf Dassler and headquartered in Herzogenaurach, Germany, creates, designs, develops, and markets a wide variety of sports and sports lifestyle products worldwide. As a European stock corporation actively traded on the MDAX in Germany with a market capitalization of approximately 7.6 billion € as of 31.12.2023, generating revenues of €8.602 billion and employing an average number of 18,023 individuals in 2023, Puma can be considered as a large-cap company. Via its three major geographical regions, EMEA (Europe, the Middle East, and Africa), the Americas (North and Latin America), and Asia/Pacific and its three products segments, footwear, apparel, and accessories, the company serves a broad global customer base with varying needs. The distribution of its products is managed through two channels comprising wholesale and direct-to-consumer (DTC) distribution through owned retail stores and e-commerce. At end of 2023, Puma controlled directly or indirectly 99 subsidiaries, coordinated by the headquarter in Herzogenaurach and responsible for marketing and distributing the products worldwide. The company's strategy is centered around three core objectives: elevating the brand, increasing product excellence, and improving distribution quality. To elevate the brand, Puma follows a "Fewer-bigger-better" approach, partnering with top-tier brand ambassadors from the entertainment sector, including Rihanna and ASAP Rocky, prominent athletes and teams from various sports. Additionally, by strongly emphasizing innovation and adapting its products to meet local preferences and tastes, the company aims to enhance product excellence. The company also focuses on optimizing distribution quality through carefully selecting the most desirable wholesale and retail channels. Within this strategic framework, special emphasis is put on expanding the market share in the US and China, regions

where the company sees significant growth potential. Overall, given Puma's global presence, with 99 subsidiaries and operations in both developed and emerging markets, and its diversified product offerings across three business segments, among other things, the company perfectly exemplifies the previously introduced definition of a multinational enterprise (Puma SE, 2023a).

3.2. Data collection

Due to the numerous challenges in the DCF valuation of MNE, a thorough collection, understanding and analysis of available quantitative and qualitative data form the fundamental basis for conducting the case study approach for Puma SE.

Therefore, in the first step, data from the last five financial years (2019–2023) was gathered from the two databases Factiva and Orbis to get a well-rounded picture of Puma's past financial performance and potential future developments. This data comprised the yearly consolidated financial statements in Euro (€), prepared according to the International Financial Reporting Standards (IFRS), including the Profit & Loss (P&L), cash flow statement, balance sheet, and segment reporting, which specifies, for instance, revenue allocations across different segments and regions. However, challenges arose due to discrepancies between the two data sources. The data varied in format (csv vs. excel), availability of information, the presentation of financial numbers (in millions of € vs. €), and the structure of financial statements, such as the organization of balance sheet items and the granularity of reported information. Additionally, due to differences in the classification of financial items, the comparability of operating profits and other financial figures between Puma's reports and the two databases was negatively affected. To reconcile these differences and ensure the most accurate forecast and alignment with Puma's disclosed figures, the data from both databases were combined, adjusted, and cross-checked against Puma's published annual reports. Incomplete information on, for instance, sales and distribution, and research & development (R&D) expenses as part of the other operating expenses (OPEX) from the databases was supplemented with details from Puma's annual reports. Additionally, to further improve the accuracy and usefulness of the data for financial analysis, more detailed information about gross profit margins for the three business segments, together with thorough breakdowns of balance sheet and profit and loss items, was manually incorporated into the Excel valuation model.

Moreover, to evaluate Puma's current market position and identify potential areas for future development relative to its two main competitors, consolidated financial data for Adidas (in € according to IFRS) and Nike (in USD according to US-GAAP) was also collected for the past five years from 2019 to 2023 and key financial ratios such as gross profit margins, EBIT margins, inventory days, and sales growth rates were calculated.

In addition to quantitative financial data, qualitative information from public statements, earnings presentations, and interviews with top management of Puma was gathered to gain deeper insights into Puma's future plans and long-term objectives. Market trends, industry dynamics, and regional GDP developments were also examined, utilizing data from the OECD, Statista, industry experts and various market research centers. To refine the estimate for the cost of equity and debt, valuable information about historical industry betas for Western Europe, country risk premiums and default spreads, was obtained from the website of Aswath Damodaran, a valuation expert and professor at Stern Business School in New York.

Finally, analyst reports about Puma from companies like JP Morgan and RBC Capital Markets were carefully reviewed and compared against my own forecast, critically evaluating the analysts' underlying assumptions based on my own gathered knowledge and insights.

4. DCF VALUATION OF PUMA SE

After establishing a theoretical foundation about DCF valuation, multinational enterprises, with Puma SE as an example, and gathering the necessary data, it is important to first analyze the collected industry and economic data, in which Puma operates. This analysis helps to understand the current market status, its future trajectory, and to make well-grounded assumptions. It considers both the opportunities and threats Puma faces and is subsequently integrated with company's recent financial performance, its strengths and weaknesses and hence, set the foundation for forecasting the relevant FCFF parameters.

4.1. Market and industry analysis

The global sporting goods industry, valued at approximately \$395 billion in retail sales in 2023, is highly dynamic, characterized by its competitiveness with numerous global and local players and a diverse range of products and shifting consumer preferences (McKinsey & Company, 2024; Fortune Business Insights, 2024a). With revenues of around \$9,331 million in 2023, Puma ranked third in this competitive market, behind Adidas and Nike, generating revenues of \$23,096 million and \$51,542 million, respectively (Statista, n.d.-a).

Pre Covid-19, the sporting goods industry saw significant growth driven by rising health consciousness, sports participation, and the growing trend of incorporating sportswear into casual fashion—commonly referred to as "athleisure", among other factors (Lipson et. al, 2020; Fortune Business Insights, 2024a). However, this growth momentum was slowed down by Covid-19 and still ongoing macroeconomic and geopolitical uncertainties, such as the conflicts in the Middle East and Ukraine, persistent inflation—although it decreased in G7 countries from 8.4% in October 2022 to 2.9% by November 2023—and recession risks (Puma SE, 2023a; Gern et al., 2024; Fortune Business Insights, 2024a).

The worldwide uncertainty led to a strong volatile demand in the retail sector in recent years, resulting in supply and demand imbalances and significant overstocking issues, which negatively impacted many companies in the industry in two ways. First of all, firms had to offer their products at significant discounts through their DTC channels in order to get rid of the surplus inventory, which reduced their revenues and gross profit margins. Secondly, as wholesalers were also dealing with excess stock, the business-to-business (B2B) or wholesale channel of sporting goods companies saw reduced product sell-in to wholesalers, leading to further revenue declines (Puma SE, 2023a; Adidas AG, 2023; McKinsey & Company, 2024). According to industry experts the current inventory levels are comparable to those of 2015/16, which took more than two years to normalize (McKinsey & Company, 2024). Despite some markets showing signs of recovery due to the measures mentioned above toward the end of 2023, surplus stock issues continue to exist in regions like North America and China (Puma SE, 2023a; Adidas AG, 2023; Puma SE, 2024a).

Excess stock is also particularly problematic because of the high risk of product obsolescence in the sector caused by rapidly changing consumer preferences. Therefore, companies must

consistently invest in product excellence to adapt their offerings to meet local and evolving preferences (McKinsey & Company, 2024). Additionally, as brand loyalty decreases in the sector, it becomes crucial to stand out as firm by capitalizing on new trends such as the sustainability, "retro" and "athleisure" trend, executing successful marketing campaigns, collaborating with top athletes, sports teams, and celebrities, and leveraging new technologies, among other things (Carrol, 2023; McKinsey & Company; Puma SE, 2023a).

The current overall macro- and geopolitical uncertainty is not only reflected in volatile customer demand but also in strong currency fluctuations in emerging markets in 2023, in particular in Argentina. This currency volatility has caused a notable drop in revenues and profits in the reporting currencies of many companies during the last year 2023 (Puma SE, 2023a; Adidas AG, 2023). In addition, fluctuating procurement prices and freight costs have further reduced the gross profit margins within the industry in recent years (Puma SE, 2023a; LeRolland, 2024).

However, also positive dynamics have influenced the industry over the recent years, with trends predicted to persist into the future. Major sporting events, increased participation in sport and a greater emphasis on healthier lifestyles have become more prominent following the COVID-19 pandemic (Puma SE, 2023a; McKinsey & Company, 2024; Straits Research, 2024). Similarly, the "athleisure" trend, offering higher profit margins for sporting goods companies, has expanded the market considerably (Puma SE, 2024a; Puma SE, 2023a). This is evidenced by the development of the sportswear share on total apparel spending, which increased from 18.3%, in 2019, to 22.0% by 2022 (GlobalData, 2023).

In summary, despite the current macroeconomic challenges, the sporting goods industry grew from 2% in 2022 to 6% in 2023 and hence, continued its post-COVID recovery. However, the growth rates varied significantly across different regions, influenced by local economic conditions, which are expected to continue shaping the industry's future development (McKinsey & Company, 2024).

With 40% of global sales in 2023 being generated in the United States, it remained by far the largest market for the industry, primarily dominated by American brands. While the compounded annual growth rate (CAGR) from 2022 to 2023 was at 2%, an increasing CAGR from 2023 to 2027 6% is anticipated (Puma SE, 2024; McKinsey & Company, 2024).

The most significant growth rate in 2023 compared to the previous year 2022 experienced Latin America, with a 22% increase driven by increasing health consciousness and disposable incomes, accounting for a market share of 6.33% in 2023 (McKinsey & Company, 2024; Market Data Forecast, 2024). However, with an anticipated CAGR of 4% from 2023 until 2027 the growth is expected to slow down (McKinsey & Company, 2024).

Following Latin America, the second-highest growth at 11% from 2022 to 2023 recorded the Asia/ Pacific recovering from a decline of 4% in the previous year and holding a market share of 25.28% in 2023. While South East Asia experienced significant growth, the recovery pattern in China remains unpredictable despite slow improvements post-COVID disruptions (McKinsey & Company, 2024). However, industry experts, see substantial growth opportunities in this largest Asian market, reflected in a forecasted CAGR of 10% from 2024 to 2028 (Boston

Consulting Group, 2023). Yet, economic analysts warn that macroeconomic difficulties could cause Chinese consumers to cut down their spending in 2024 and 2025 (McKinsey & Company, 2024; Gern et al., 2024). Additionally, India, as fastest growing large economy, may also become a significant market in the region in the long run, although it currently has relatively low levels of sports participation (Puma SE, 2024a; Euromonitor International, 2024).

For the sporting goods industry in Europe, there is a mixed picture. While Western Europe grew strongly by 8% in 2023 coming from -3% in 2022, Eastern Europe declined by -1% compared to -6% in the previous year. Going forward, both Eastern and Western Europe are anticipated to grow at the same rate of 4% from 2023 to 2027 (McKinsey & Company, 2024).

Globally, the sporting goods industry is expected to achieve a CAGR of 7% from 2023 to 2027, driven by ongoing positive sectoral trends, as mentioned above, and major upcoming sporting events such as the Summer Olympics in Paris and the UEFA Euro men's football championship in Germany in 2024. Despite this optimistic forecast, the industry must continue to navigate on going geopolitical and economic uncertainties (McKinsey & Company, 2024; Puma SE, 2023a).

Within the industry the apparel segment held the biggest market share as of 2022. However, in terms of future growth potential, the footwear segment is expected to grow the fastest with a CAGR of 6.2% from 2022 to 2027, compared to 5.9% for clothing and 5.5% for accessories driven by innovations within the segment and the increasing trend of wearing in particular sports shoes for both fitness and casual purposes (GlobalData, 2023; Fortune Business Insights, 2024b; Fortune Business Insights, 2024c)

4.2. Fundamental assumptions

Before initiating now, the forecast of the relevant FCFF parameters for Puma, critical fundamental questions must be answered to guarantee the accuracy and suitability of the financial projections.

Firstly, given Puma's operation across multiple countries, each with its currency, it is essential to determine the currency for forecasting the FCFF. Since Puma's headquarters are in Germany and its reporting currency is the Euro, the FCFF are consequently also forecasted in Euro. Assumptions concerning future currency volatility, currently significantly impacting the industry, as mentioned in point 4.1., are incorporated in the FCFF forecast and addressed by including various country or regional risk premiums in the cost of equity calculation.

Secondly, the length of the detailed forecasting period must be determined, balancing the expected growth of both the company and the market against the challenges and decreasing accuracy of long-term forecasts. Over the past decade until 2023 Puma has significantly outperformed its two main competitors, Nike (6.7%) and Adidas (3.96%), with a CAGR in revenues of 11.22% and, yet still holds a much smaller revenue base. Given Puma's position and the potential within the sporting goods industry driven by trends like "athleisure" and rising health awareness, as stated in point 4.1., a fourteen-year forecasting period, exceeding the typical range mentioned in point 2.1.2., from 2024 to 2037 is selected (Statista, n.d.-b). This period is considered appropriate as it provides a realistic timeframe to capture the potential growth of Puma and the market and to smoothly transition into the steady growth phase, which is necessary

for applying the terminal value concept without going into excessively speculative future scenarios (*see also point 4.4.*).

Lastly, the decision on whether to forecast the FCFF on an aggregated or disaggregated basis needs to be addressed. Although a disaggregated approach, combining segment and country level, would theoretically provide the most accurate FCFF forecast, as mentioned in point 2.3., the complexity and the lack of necessary detailed data make this approach impractical. However, Puma provides detailed financial breakdowns at regional levels, which include key components needed for the FCFF forecast such as revenue, EBIT, CAPEX, depreciation and amortization, and main non-cash net working capital components, making a disaggregated FCFF forecast at least on a regional level theoretically possible. Yet, the absence of the detailed financial structure per region, future plans for important parameters and the existence of significant centralized costs complicate this approach. For instance, centralized expenses for the EBIT, which in 2023 amounted to almost €750 million—surpassing the EBIT itself of €621.5 million in 2023—cannot be distinctly assigned to specific regions. Therefore, a more feasible approach is to forecast revenues and gross profit numbers without attempting a full disaggregation of all FCFF components, given the absence of centralized costs in these figures and the manageability of complexity above gross profit. While Puma provides substantial data at regional level, it does not disclose gross profit margins by region. This necessitates a shift to forecasting at product segment level, where Puma provides both revenue figures and gross profit margins as well as information about future strategic initiatives, despite overall lower financial information availability (Puma SE, 2023a; Puma SE, 2024a). This approach ensures that the observable differences in gross profit margins and sales growth across the three product segments are taken into account without creating undue precision by forecasting all FCFF components under incomplete data conditions. Once revenues and gross profits for all three segments were forecasted, these figures are aggregated for subsequent financial projections below the gross profit line. Additionally, the aggregated revenue numbers are also allocated to the different regions, Puma is operating in, over the planning period to be later able to incorporate future expectations when weighting the regional risk premiums for Puma for the cost of equity (*see point 4.5.*).

4.3. FCFF forecast over the planning period

The basis for the forecast is the historical financial data from the most recent years five financial years from 2019 to 2023, excluding 2020 and 2021. These two years do not reflect normal operating conditions due to the significant market disruptions caused by the pandemic. Instead, the focus is put on the financial data from the two most recent years, 2022 and 2023, taking into account that some residual effects of the pandemic may still affect these numbers. Thus, simple averages from 2022 and 2023 are not suffice as proxies for future performance; instead, a more sophisticated analysis, incorporating market trends and threats, mentioned in point 4.1., as well as Puma's strategic goals and competitive strengths, is performed to ensure an accurate forecast.

As the **revenue** forecast forms the basis for other projected items in the P&L and balance sheet through the development of ratios, a very high level of detail is put on the revenue planning. Examining Puma's performance over the past five years reveals consistent growth in sales across all years except the pandemic-impacted 2020 (*see Annex A*). The subsequent years 2021 and

2022 saw a strong rebound, followed by a slowdown in sales growth from 2022 to 2023 due to more difficult macroeconomic environment and currency volatility, resulting in a 1.61% sales growth, while currency-adjusted rising at 6.6% in 2023 (Puma SE, 2023a). During this time frame the sales growth rates varied significantly across the three product segments (*see Annex A*). However, some fundamental factors have consistently influenced the sales across all segments, and I expect these to persist into the future. To provide a clear and structured forecast, I first outline these general factors I anticipate to impact the overall sales growth across all segments during the forecasting period, before discussing the detailed assumptions made for segment-specific revenue projections:

In 2024, I expect the macroeconomic environment to remain uncertain and challenging for the industry. Despite a general decline in inflation rates, the core inflation (consumer price index without energy prices and groceries) for G7 countries as of January 2024 stayed at 3.8%, well above the 2% target, leading to continued consumer conservatism (Gern et al., 2024). Puma, like the broader sporting goods industry as mentioned in point 4.1., has experienced issues with elevated inventory levels in the recent years, although not as strongly as, for instance, its competitor Adidas (McKinsey & Company, 2024; Puma SE, 2023a; Adidas AG, 2023). Despite a significant reduction of inventory by €440.7 million in 2023 through promotional activities to reach healthier inventory levels, Puma and its wholesale partners, particularly in America and China, continue to deal with excess stock (Puma SE, 2023a). Given this situation, I expect, on the one hand, Puma's sales to wholesale partners—which constituted 75.2% of Puma's total sales in 2023 and are projected to remain a major portion of sales in the future—to still be below normal levels for the next two year, 2024 and 2025, as predicted by industry experts (*see point 4.1.*), despite an anticipated recovery starting from the second half of 2024 (Puma SE, 2024b; Puma SE, 2023a). On the other hand, I anticipate this to lead to less full price realization in 2024 and 2025 due to continued, albeit reduced, promotional activities via Puma's own DTC channel. Successful product launches (*see sales segment forecast below*) and Puma's first global brand campaign in a decade, kicked off in April 2024, I expect to positively impact sales in 2024 and 2025. Moreover, the continued rollout of the company's first shopping app over the next 12 to 18 months, starting from H2 2024, to several new markets including Europe and Latin America, will further boosting sales, as it has already shown promising results in countries such as India, the US, and the UK since its launch 2022 (Puma SE, 2023a; Puma SE, 2024a). Currency volatility, I predict to persist in 2024 but not as severe as in the previous year. While Puma faced a €400 million reduction in sales in the reporting currency due to currency devaluation impacts in 2023, the company predicts in 2024 a milder impact of only €200 million and in the long run to fully compensate the negative effects of currency devaluation through corresponding price increases (Puma SE, 2024a; Puma SE, 2023a). Despite a negative currency valuation impact of €100 million in Q1 2024, leading to a slightly negative currency unadjusted sales growth for the first quarter, overall sales outperformed analyst expectations such as those from JP Morgan and Hauck Aufhäuser Investment Banking (Puma SE, 2024c; J.P. Morgan, 2024; Hauck & Aufhäuser Investment Banking, 2024). Driven by improved sell-ins to wholesalers in H2 2024, reduced impacts from currency devaluation in the remaining year, and major sporting events such as the Olympics and European Championships in Q2 and Q3 2024, Puma predicts a quarterly acceleration of sales growth (Puma SE, 2024c). For the whole year 2024, the company

anticipates a currency-adjusted growth in the mid-digit percentage range of 4-6% (Puma SE, 2023a). With last year's sales growing by 6.6% on a currency-adjusted basis, resulting in a currency unadjusted revenue rise of 1.61%, I anticipate the currency-unadjusted growth to more than double to 3.96% for 2024 compared to the previous year, as shown in *Table 1* on page 24. This is the result of the reduced negative impacts of currency fluctuations, sell-ins to wholesalers and promotional activities and ongoing positive strategic initiatives, as mentioned above, among other things (*see segment revenue forecast starting on page 23 and the tab "revenue & margin forecast" in the attached excel file for more details*).

Looking forward to 2025, I expect the macroeconomic uncertainty to decrease, leading to more stable currency fluctuations and continuously declining inflation rates, as seen in the recent years (Gern et al., 2024). Additionally, I anticipate inventory to almost reach normal levels, further increasing sales to wholesalers and reducing extraordinary promotional effects via the DTC channel. The ongoing impact of the 2024 brand campaign, the continued expansion of the shopping app as well as successful product launches, I project to result in a significantly higher growth rate of 6.49% in 2025 compared to 2024.

By 2026, I assume macroeconomic uncertainty to substantially diminish, and inflation rates and currency volatility to fully normalize, bringing revenues back to pre-COVID levels across nearly all regions (LeRolland, 2024). Furthermore, I expect elevated inventory levels to be fully reduced, making 2026 a peak year for Puma in terms of revenue growth, with an expected increase of 7.41% over the previous year.

Beyond 2026, while the revenues will continue to increase, I project the pace of the growth to slow gradually until the end of the planning period 2037 as markets become more saturated and competition intensifies with new players entering the market, capitalizing on trends within the sporting goods industry, and local players striving to regain market shares. Starting from 2027, I expect the sales growth rate for all segments to decline each year by a factor of 0.9. Thus, by 2037, an overall sales growth rate of 2.35% is anticipated, resulting in a total CAGR of 4.26% over the forecasting period.

The entire sales forecast is built on the following fundamental conditions for Puma, the industry and the worldwide economy:

First, I anticipate that Puma will capitalize on positive industry trends, such as athleisure and retro fashion. These trends as well as an increased global interest in sports and a healthier lifestyle, I expect to continue over the entire forecasting period. Planned product launches of Puma, particularly in 2024 and subsequent years, I project to be successful. Additionally, the continued focus on sustainability and the integration of cutting-edge technologies will enhance the sustainability of Puma's products, as evidenced by the fact that currently, eight out of ten products are made from a significant proportion of recycled or certified materials such as better cotton or recycled polyester (Puma SE, 2023a). This commitment to sustainability, I expect to improve Puma's standing in global sustainability rankings, maintaining its lead over competitors like Adidas (Russel, 2023). Furthermore, by taking advantage of advanced planning tools and technologies, I project Puma to avoid elevated inventory levels going forward. Additionally, Puma will continue and expand its engagements with high-profile athlete, celebrity ambassadors

and successful sports teams including Manchester City, Borussia Dortmund, and AC Milan. By leveraging the global appeal and fan bases of these renowned entities as well as running successful marketing campaigns, I anticipate Puma to sustain its market relevance ("brand heat"). This will be further enhanced by Puma's unique agreement with Formula 1 (F1) in 2023 to become the sport's official licensing partner and exclusive trackside retailer, leveraging the expanding fan base of F1 racing (Puma SE, 2023a). On the geopolitical front, I assume that current conflicts such as the war in Ukraine and the Middle East conflict will not escalate further but will begin to deescalate by 2026. Additionally, during the forecast period, I do not anticipate new geopolitical disruptions, such as a potential trade war between China and the USA, even in the event of significant political developments like a potential re-election of Trump in November 2024 and pandemics, as experienced during Covid-19.

The company-wide anticipated sales growth rates over the planning period are the result of the individual sales forecast on product segment level, which is presented in detail in the following:

The **footwear segment**, representing the largest proportion of Puma's total revenue, has shown remarkable growth, rising from 46.39% of total revenue in 2019 to 53.28% in 2023, as illustrated in *Annex B*, despite the other two segments, apparel and accessories, also growing with a CAGR above 5% each from 2019 to 2023. Although there was a slowdown in 2023, the footwear segment has maintained a strong average sales growth of 21.32% over the last two years, marking it as the fastest-growing category within Puma over the period (*see Annex A*) (Puma SE, 2023a). This momentum, I anticipate to continue underlined by strategic initiatives and market trends. As already mentioned in point 4.1., market analysts project that the footwear segment in the overall market will expand the fastest between 2022 and 2027, mostly due to the "athleisure" trend, which is particularly relevant to the shoe sector. Puma seeks to capitalize on this trend, evidenced by the 2024 launch of new terrace and skate styles such as Palermo and Suede XL, which have shown promising sales acceleration month over month. Additionally, the planned launches of the vintage running franchise Easy Rider and low-profile shoes including Mostro, Speedcat, and Inhale in 2024 indicate Puma's intention to take advantage of the retro trend (Puma SE, 2023a; Puma, 2024c). Furthermore, in the crucial football footwear segment, particularly significant in Europe and South America, Puma aims to increase its share with new versions of the successful boots ULTRA and FUTURE, along with a redesigned KING boot made without kangaroo leather. Launched in 2023, the new KING boot ("K-Better") uses a vegan material, composed of at least 20% recycled material, outperforming earlier models in touch, comfort, and durability testing. Puma even became the first company in the industry to entirely cease producing football boots with kangaroo leather in 2023, showcasing its commitment to innovation and sustainability. Moreover, Puma's continued implementation of its own innovative Nitro foam technology in running shoes, coupled with successful launches in the basketball shoe category, such as the MB.03 in 2023, positions the company well to potentially increase its market share in both the running and basketball footwear segments (Puma SE, 2023a). The Q1 2024 results further underscored the strength of the segment, which accounted for 56% of the company's total sales, up from 53.28% in 2023 (Puma SE, 2024c). Although quarterly figures can vary and are influenced by seasonal factors, the trend towards a growing share of footwear in total sales aligns with that seen in competitors like Nike and Adidas, where footwear accounted for 68.03% and 56.65% of total sales, respectively, in 2023 (Nike Inc., 2023; Adidas

AG, 2023). Overall, with a CAGR of 4.84% from 2024 until 2037 and an increase in its revenue share by 5.41 percentage points compared to 2023 to 58.70% by 2037, I expect the footwear segments to grow the strongest over the planning period, as illustrated in *Table 1 and 2* below.

For the Puma’s **apparel segment**, I anticipate the second fastest growth throughout the forecasting period. Despite being the lowest performing segment in 2023, mainly due to a challenging market environment that resulted in a negative growth that year, I anticipate the segment to recover as market uncertainty decreases. After a lower assumed growth rate for the segment for 2024 compared to the accessories segment, I expect to surpass it in 2025, with an overall CAGR of 3.70% over the planning period. The estimated CAGR is based on the market's underlying size and strong growth expectations from 2022 and 2027 (second only to footwear) according to industry experts. Additionally, Puma's strategic sports teams’ sponsorships, including successful football clubs and national teams, with a significant addition by Puma post-European Championship in 2024, I anticipate to boost football jersey sales due to the loyal and large fan base of these teams (Fründt, 2024; Puma SE, 2023a). Furthermore, with the launch of new apparel products in the lifestyle and training segments, Puma is set to expand its presence in segments that show increasing customer demand (Puma SE, 2024a). By the end of the forecasting period in 2037, I project the apparel segment to generate 29.06% of the overall revenues, coming from 32.12% in 2023. The relative decline can be attributed to the stronger sales growth in the footwear segment, a trend already observable between 2019 and 2023, where the apparel segment's revenue share decreased by even 5.41 percentage points. The projected share for Puma's apparel segment in 2037 aligns also closely with that of Nike’s apparel share in 2023, which stood at 28.81% (Nike Inc., 2023).

Puma's **accessories segment**, I predict to develop in a similar manner to the apparel segment, but at a slightly lower CAGR of 3.13% throughout the forecasting period, as expected by the overall market forecast for this segment. This can be attributed to the fact that accessories have less potential to benefit from the athleisure trend compared to the footwear and apparel. By the end of the detailed planning period, I project the revenue share of the accessories segment to stabilize at 12.25%, decreasing by 2.35 percentage points from 14.59% in 2023 (Puma SE, 2023a). Overall, the segment’s total share in revenues is still significantly above the share of Adidas and Nike with 6.92% and 3.55% in 2023 (Adidas AG, 2023; Nike Inc. 2023).

Table 1: (Expected) revenue growth in % by segment from 2022 to 2037

Revenue growth in % by segment	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
Footwear	36.49%	6.15%	6.08%	7.41%	8.45%	7.60%	6.84%	6.16%	5.54%	4.99%	4.49%	4.04%	3.64%	3.27%	2.95%	2.65%
Apparel	15.06%	4.60%	1.49%	5.66%	6.45%	5.81%	5.23%	4.70%	4.23%	3.81%	3.43%	3.09%	2.78%	2.50%	2.25%	2.03%
Accessories	11.25%	0.34%	1.65%	4.79%	5.46%	4.92%	4.42%	3.98%	3.58%	3.23%	2.90%	2.61%	2.35%	2.12%	1.90%	1.71%
Total growth	24.39%	1.61%	3.96%	6.49%	7.41%	6.68%	6.02%	5.43%	4.89%	4.41%	3.97%	3.58%	3.22%	2.90%	2.61%	2.35%

Source: Own elaboration using Puma’s financial data

Table 2: (Expected) revenue allocation in % by segment from 2022 to 2037

Revenue allocation in %	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
Footwear	51.0%	53.3%	54.4%	54.8%	55.4%	55.9%	56.3%	56.7%	57.0%	57.4%	57.6%	57.9%	58.1%	58.3%	58.5%	58.7%
Apparel	34.2%	32.1%	31.4%	31.1%	30.8%	30.6%	30.4%	30.1%	30.0%	29.8%	29.6%	29.5%	29.4%	29.3%	29.1%	29.1%
Accessories	14.8%	14.6%	14.3%	14.0%	13.8%	13.6%	13.4%	13.2%	13.0%	12.9%	12.7%	12.6%	12.5%	12.4%	12.3%	12.2%
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

Source: Own elaboration using Puma’s financial data

Lastly, Puma's projected revenues are allocated across various regions to account for predicted changes in its market presence over the forecasting period, which are later incorporated when aggregating the regional risk premiums into the cost of equity (*see point 4.5*). Puma's combined management report only distinguishes between three broad regions: Asia/Pacific, EMEA, and America, increasing the difficulty to accurately capture Puma's risk exposure, since the risk profile between, for instance, Latin America and North America in the American region can differ fundamentally. As Puma provides a more detailed breakdown in their segment reporting, differentiating between 11 regions and, for example, also separately disclosing revenue shares for the US, the rest of North America and Latin America, rather than grouping them as "Americas", this regional breakdown is used. It is important to note that based on this breakdown, South East Asia and India are categorized under Eastern Europe, Middle East, and Africa (EEMEA) instead of Asia/Pacific in the combined management report. Additionally, a new region labeled "Stichd", a subsidiary of Puma that creates licensed products for various brand partners, is also included (Puma SE, 2023a).

The regional revenue allocation is based on the following fundamental assumptions, focusing on the most important regions:

As the largest sporting goods market with moderate growth expectations, the **US** presents both significant potential and challenges due to the strong dominance of American brands. In 2023, Puma ranked only eighth with less than 3% market share in the athletic footwear segment and experienced a decline in revenue in the region primarily due to lower sell-ins to wholesale partners and higher promotional activities, as particular the US was affected by elevated inventory levels (Puma SE, 2023a; Puma SE, 2024a). I anticipate this slowdown to continue into 2024 and 2025, with full normalization expected by 2026. As Puma strategically prioritizes this region and heavily invests in the US—exemplified by successful partnerships with top US athletes such as Scoot Henderson and Breanna Stewart in basketball, Christian Pulisic in football, and entertainers like Rihanna and ASAP Rocky—alongside their re-entry into basketball in 2018, a crucial category in the US, the Formula 1 sponsorship in 2023, and a focus on creating more US-first products and improving distribution quality, I expect Puma to eventually enhance their market share in the long run (Puma SE, 2023a; Puma SE, 2024a). By 2037, I anticipate the company to generate 24.55% of its revenue in the US, compared to 22.48% in 2023, growing at the second-highest regional CAGR of 5.23% over the forecasting period (*see Annex C & D*).

Latin America was the fastest growing region for Puma in the past two years, 2022 and 2023, averaging 43.49%, though it slowed to 12.89% in 2023, also due to strong currency fluctuations, mainly caused by the devaluation of the Argentine peso in 2023 (Puma SE, 2023a). Driven by the strong football segment, new football boot launches, and endorsements from popular local brand ambassadors like Neymar, I expect the region to continue growing, albeit at a rate below previous years (Puma SE, 2023a; Puma SE, 2022; Puma SE, 2024a). Over the forecasting period, I anticipate a CAGR of 4.57%, increasing the revenue share to 15.01% in 2037, up from 14.41% in 2023 (*see Annex D*).

The Chinese market, referred to as **Greater China**, is highly competitive with strong local competitors. In this environment, Puma occupies the 16th position with a market share of less than 1% (Puma SE, 2024a). Currently, the Chinese market is suffering from economic

uncertainty and a slower than expected post-Covid recovery, along with issues of elevated inventory levels for Puma and its wholesale partners, which, however, are not as severe as those in the US market (Reuters, 2022; Puma SE, 2024a). Despite these challenges, Greater China holds substantial growth potential, as predicted by the Boston Consulting Group (2023) and explaining why Puma strategically prioritizes on its expanding presence there. While in 2024 and 2025 I expect the market to remain affected by a challenging economic environment and a slightly reduced sell-ins to wholesale partners and promotional activities, I project a significant acceleration in sales growth starting from 2026. This is based on an expected decrease in conservative consumer behavior due to a decline in macroeconomic uncertainty and a return to fully normalized inventory levels. Additionally, Puma's ambition to generate long-term at least 10% of its overall sales from this region reflected by its strategic initiatives such as the successful initiation and continued roll-out of new DTC store concepts, along with collaborations with local athletes and celebrities and Puma's efforts to adapt its products to align more closely with local consumer preferences, lay a solid foundation for sustained success in this dynamic market (Puma SE, 2023a; Puma SE, 2024a). Overall, I anticipate a CAGR 6.54% over the planning period for Greater China, resulting in a revenue share of 8.59% by 2037, coming from 6.41% in 2023. Furthermore, the broader **Asia/Pacific** region, excluding South East Asia and India, I project to experience a CAGR of 5.85% reaching a revenue share of 15.95% by 2033 compared to 13.18% in 2023 (*see Annex D*).

As Puma's home market, **Western Europe** has remained relatively robust compared to other regions over the past years. I expect the growth in this region to be particularly strong in 2024 and 2025, counterbalancing lower or slightly negative growth rates in the Chinese and US markets. As other markets begin to grow, the percentage of total sales coming from Western Europe will decrease as the region becomes saturated. Over the planning, I anticipate a CAGR of 2.23%, with the revenue share decreasing to 18.44% in 2037 from 23.44% in 2023 (*see Annex D*).

The **EEMEA** region including South East Asia and India has shown strong growth for Puma with an average growth rate of 29.35% for the last two years, 2022 and 2023. Additionally, as a market leader in India with partnerships with the most prominent local athletes, such as the Indian cricket superstar Virat Kohliart, Puma is well-positioned to capitalize on India's huge potential for the sporting goods industry as the fastest-growing large economy in the long run (Marketer Asia, 2024; Puma SE, 2024a). Further fueled by the industry's growth momentum in South East Asia, I predict a regional CAGR of 4.97% over the forecasting period, leading to an overall revenue share of 21.30% in 2037 coming from 18.91% in 2023 (*see Annex D*).

The "**Stichd**" subsidiary I expect to see a slight positive CAGR over the forecasting period of 0.21%. However, its share of overall sales, I project to decrease to 3.23% in 2037 compared to 5.69% in 2023, due to more substantial expansion in other markets (*see Annex D*).

Moving further down the P&L, in the next step, the **gross profit** is forecasted, which is the result of subtracting the cost of sales, primary including the carrying amounts of inventory recognized as expenses during the period, from the net revenues. As Puma prepares the P&L using the cost of sales and not the total cost method, only costs for products sold are incorporated in the cost of sales (Puma SE, 2023a). The overall gross profit forecast for Puma over the planning period is

linked directly to the sales forecast through the projection of the gross profit margin (gross profit divided by sales), rather than forecasting gross profit growth separately, to ensure a consistent alignment between revenue projections and cost of sales.

Over the past two years, 2022 and 2023, there has been a noticeable dip in Puma's gross profit margin due to adverse price and cost developments compared to 2021 (*see Annex E*). While extraordinary promotional measures to reduce high inventories and currency fluctuations had an impact on prices, higher procurement prices and increased freight costs as well as an unfavorable channel and regional mix drove up the cost of sales (Puma SE, 2023a; LeRolland, 2024). This trend is also reflected in the gross profit margins of competitors like Adidas and Nike. Adidas maintained a higher gross profit margin than Puma, at 47.3% in 2022 and 47.5% in 2023, although being down from 50.7% in 2021. Nike's gross profit margins at 45.98% in 2022 and 43.58% in 2023 were lower than Puma's, with a slight increase in 2022 from 44.82% in 2021 before a significant drop in 2023 (Adidas AG, 2023; Nike Inc., 2023).

While distinct differences in gross profit margins exist at the segment level for Puma, certain general factors have influenced all segments similarly and I believe will continue to do so. Thus, before delving into the detailed segment-level gross profit margin forecast, it is essential to discuss these fundamental factors that I expect to shape the overall future gross profit margin developments:

Promotional activities, which have been extraordinary, especially in the last year 2023, I expect to continue impacting the gross profit margins in 2024 and 2025, but with a much lower extent than before. Starting from a very low baseline of 46.35% in 2023, I anticipate the most significant increase in the forecast period in 2024, with a projected gross profit margin growth of 1,48% to reach 47.03% (*see Annex G*). This positive adjustment, I expect to be supported by decreased sourcing and freight costs and an improved product and distribution channel mix relative to previous years. This trend is already visible in Puma's reported Q1 2024 gross profit margin of 47.5%, despite ongoing but lower currency fluctuations (Puma SE, 2024c). As gross profit margins can vary based on the quarter and seasonal factors, influenced by price changes and promotional activities, I project the margin to slightly decrease until year-end 2024, still marking a significant recovery from 2023.

In the years following 2024 until 2028, I expect Puma's gross profit margin to continue to improve, albeit at a more moderate pace, influenced by several key factors. The growth in demand and offerings in the lucrative lifestyle and sportstyle prime segment, fueled by the "athleisure" trend, is expected to boost Puma's gross profit margins. Additionally, slight changes in the distribution channel mix, shifting towards more DTC sales as opposed to traditional wholesale, driven by the opening of new stores and new store concepts in China as well as the continued roll out of Puma's shopping app, will improve the overall gross profit margin as no intermediaries are involved. The transition to more DTC sales will also be partly driven by wholesale partners focusing on improving sell-through rates and adopting more cautious sell-in practices in the first two years of the planning period in 2024 and 2025, aiming to optimize inventory levels and thus, lowering Puma's wholesale revenues. However, the overall change towards more DTC sales, I assume to be gradual over the planning period, as Puma values its omnichannel distribution strategy and views the DTC channel as a complement rather than a

replacement for the wholesale channel (Puma SE, 2023a). In 2037, I expect the DTC channel to generate 26,22%, coming from 24,8% in 2023 (*see Annex H*). Moreover, larger order volumes for raw materials, driven by higher revenues, I project to reduce the cost per product and to further improve the margin. Currency volatility, a significant factor affecting Puma's financial performance in the past year 2023, I expect to continue normalizing as macroeconomic uncertainty decreases, thereby reducing its negative impact on Puma's gross profit margins moving forward. By 2025, I anticipate the gross profit margin to reach 47.71% (*see Annex G*), aligning with Puma's expectations to achieve one within the range of 47.3% and 48.3% for that year (Puma SE, 2024a).

Beginning in 2029, I project the gross profit margin for Puma to experience a gradual decline for all segments due to increasing market saturation and competition with local players, which necessitates aggressive pricing strategies to maintain market share, negatively affecting the company's gross profit margin. Furthermore, I expect the gross profit margin to be pressured by rising labor costs in sourcing countries. By the end of the forecasting period in 2037, I anticipate Puma's gross profit margin to be at 48.26% (*see Annex G*). Throughout the entire forecast period, I assume that there will be no unforeseen supply chain disruptions similar to those experienced during the Covid pandemic. Additionally, Puma, which sources 95% of its products from Asia, primarily China, will continue to actively manage its sourcing risk through regular reviews and adjustments of its sourcing portfolio to reduce dependence on individual suppliers or markets (Puma SE, 2023a). Moreover, strong price fluctuations for raw materials, which have impacted the industry in past years, I expect to fully stabilize over the forecasting period in line with the overall assumed decrease in macroeconomic uncertainty by 2026.

The overall gross profit margin forecast for Puma is based on the individual projections of its three business segments, which are detailed in the following:

During the past five years, except for 2021, the footwear segment consistently registered the lowest gross profit margins among the segments. While, there was a noticeable recovery in the footwear and apparel segments from 2022 to 2023, the accessories segment experienced a significant decline in margins in these years (*see Annex F*).

For the **footwear segment**, I expect the launches and planned launches of models like Palermo, Suede XL, Easy Rider, and low-profile shoes such as Mostro and Speedcat in the lucrative lifestyle segment to significantly enhance the product mix, which will result in a new record high gross profit margin of 47.59% by 2028, surpassing its previous peak of 47.3% in 2021 (*see Annex G*).

In the **apparel segment**, I anticipate a margin recovery as a result of an expanded presence in the lifestyle and the emerging training segments, apart from the above-mentioned factors. This leads to a peak margin of 50.31% in 2028, marking the strongest CAGR from 2023 to 2037, although the segment will not reach the levels observed before COVID (*see Annex G*).

Conversely, the **accessories segment**, after a sharp decline in 2023, I forecast to gradually improve, with the most substantial growth in margins expected by 2026. By 2028, I project it to

achieve a gross margin of 48.47%, however, growing at the lowest CAGR from 2023 to 2037 due to its lesser potential for taking advantage of the lucrative lifestyle segment (*see Annex G*).

Post-2028, I anticipate a uniform decline in margins across all segments due to the general factors previously outlined.

Due to the absence of detailed information and financial breakdowns below gross profit at product segment level and the presence of substantial centralized expenses on regional level, Puma's financial forecast below the gross profit line in the Profit & Loss statement is conducted on an aggregated basis, as explained in *point 4.2*. Before arriving at the EBIT and subsequently applying the projected income tax rate to derive the NOPAT, all **other operating income and expenses** are forecasted.

First, Puma records royalty and commission income below the gross profit, arising from licensing agreements with independent partners in charge of the design, development, manufacturing, and distribution of a variety of products, including watches, glasses, safety shoes, workwear, and gaming accessories (Puma SE, 2023a). Over the last two years, 2022 and 2023, this income stream has experienced significant growth, with increases of 41.42% and 13.91%, resulting in revenues of €33.8 million in 2022 and €38.5 million in 2023 (*see Annex I*). This growth is attributable to the issuance of new licenses in growing product categories, such as golf (Puma SE, 2023a). Given the robust performance in recent years and considering the often-long-term nature of licensing agreements, along with the potential for expansion into new product categories, I expect royalty and commission income to continue its upward trend. By 2037, I anticipate it to reach approximately €67.942 million (*see Annex J*). This number is based on the assumption that royalty and commission income will maintain a consistent proportion of 0.42% relative to sales, mirroring the average rate observed in 2022 and 2023, due to the lack of detailed past and future information and its relatively low materiality.

Below the royalty and commission income there are the other **OPEX**, constituting a huge share of Puma's overall expenses (€3.4214 billion in 2023) and encompassing sales & distribution, product management & merchandising, research and development, and administrative & general expenses (Puma SE, 2023a).

As Puma is preparing its Profit & Loss statement using the cost of sales method, it is important to note, that this accounting method does not separately disclose depreciation, amortization and impairment, or personnel expenses within the P&L, but instead, allocates them to the respective functions where they occur. However, in the notes of the annual report Puma does provide a separate overview on total depreciation and amortization and personnel expenses, although without specifying their allocation within the OPEX categories (Puma SE, 2023a). For future financial planning, depreciation and amortization expenses are planned separately to align them with the forecasted CAPEX, while they are still allocated within the OPEX categories based on the relative weights of each expense category in the overall OPEX after personnel expenses. Personnel expenses were allocated before based on the number of employees in each respective functional area in the past and their assumed allocation in the future. To still ensure that the overall forecasted OPEX remains realistic and aligns with the sales forecast, the remaining

amount (OPEX – allocated Depreciation & amortization – allocated personnel expenses) was adjusted accordingly (*see tab “OPEX forecast” in the attached excel file for more details*).

For forecasting the OPEX, I followed a similar approach to that used for gross profit, tying these costs directly to anticipated sales to reflect the inherent relationship between OPEX and business activity; as sales rise, so do related expenses for marketing, product development, and sales & distribution. Puma also applies such a ratio to cap marketing expenses within the OPEX at no more than 10% of total sales, to effectively manage and control these expenses (Puma SE, 2024a).

The largest component of Puma's OPEX is sales and distribution expenses, accounting for 81.81% of the total in 2023 and primarily including marketing and retail expenses, expenses associated with the Group's own retail activities, logistics, and other variable sales and distribution costs (Puma SE, 2023). This proportion of sales and distribution expenses relative to total sales increased from 31.63% in 2022 to 32.54% in 2023 (*see Annex K*). I anticipate this upward trend to continue into 2024, especially with Puma's investment in its first global brand campaign in a decade driving up the marketing expenditures. Furthermore, the rising importance and shift towards more DTC sales are likely to further increase Puma's logistics and distribution expenses. Consequently, the sales and distribution expenses relative to sales, I project to rise to 32.92% in 2024 (*see Annex L*).

Additionally, product management and merchandising, along with research and development expenses, which accounted for 4.83% of overall OPEX in 2023, also showed an increase from 1.81% in 2022 to 1.99% in % of sales in 2023 (*see Annex K*). This upward trend, I expect to continue into 2024, reflecting the need in the sporting goods industry to continuously innovate and adapt to evolving market trends and consumer preferences, as mentioned in point 4.1., and leading to 2.07% of sales in 2024 (*see Annex L*).

Administrative and general expenses, which comprised 13.65% of total OPEX in 2023, have seen a decline relative to sales since 2020, likely due to efficiency gains through automation and reduced personnel requirements. I forecast this trend to continue, albeit at a slower rate, resulting in a ratio of 5.21% in 2024, slightly down from 5.24% in 2023 (*see Annex L*).

Overall, I anticipate the OPEX-to-sales ratio to be equal to 40.2% in 2024, continuing the increasing trend from 38.94% in 2022 to 39.78% in 2023 (*see Annex L*). This forecasted number for 2024 is also in line with the OPEX-to-sales ratio of 40.2% reported by Puma in Q1 2024 (Puma SE, 2024c). For the remaining years of the forecasting period after 2024, I anticipate that while expenses related to Puma's own retail operations will increase due to a growing DTC share, along with investments in marketing, research and development and product and merchandising, these will be offset by improved distribution quality, operational excellence in distribution centers, process automation and economies of scale from existing organizational setups, as intended by Puma (Puma SE, 2024a). As it takes time to fully realize the efficiency advantages, I expect an annual decrease in the OPEX-to-sales ratio of 0.03 percentage points for the first five years until 2028, while from 2029 onwards, I project this reduction to increase to 0.07 percentage points per year. At the end of the forecasting period in 2037 this results in an overall OPEX-to-sales ratio of 39.45% (*see Annex L*). Additionally, the anticipated OPEX-to-sales ratio of 40.17%

for 2025 aligns with Puma's anticipated range of 39.3% to 40.3% for this year (Puma SE, 2024a). Given the highly competitive and dynamic nature of the sporting goods industry, I assess that although efficiency gains will be realized, they will not be as significant as Puma likely projects in the OPEX-to-sales ratio due to the necessary expenditures required to maintain a strong brand presence and innovate product offerings. While Puma's forecasted OPEX-to-sales ratios are higher than those of Nike at 31.98% in 2023, they are still significantly lower than Adidas's 47% in the same year. Even when comparing to Adidas's ratio in 2019 of 41.64%, given that the last two years 2022 and 2023 have been in particular challenging for the company, Puma's projections still suggest a competitive advantage over its German rival in terms of OPEX-to-sales ratio based on Adidas historical performance (Nike Inc., 2023; Adidas AG, 2022; Adidas AG, 2023).

Before reaching EBIT, the other operating income must be considered, which includes revenues from the sale of fixed assets, selling profits from finance leases, and rental income and is projected to be €6.14 million annually over the entire forecasting period. Due to the low materiality of this figure, a detailed explanation of the forecasted number is not provided in the thesis but can be found in *Annex M*.

Considering all forecasted parameters, I expect Puma to generate an EBIT of 655 million € with an EBIT margin of 7.33% in 2024, as reflected in *Table 3* on page 32, which falls between the company's projected EBIT range of 620 to 700 million € for 2024 (Puma SE, 2023a). This is a slight improvement compared to the EBIT margin of 7.23% and the EBIT of 621.5 million in the previous year 2023. Additionally, the projected EBIT margin of 8.04% for 2025 is within the lower end of Puma's targeted range of 8% to 8.5% for this year (Puma SE, 2024a). Over the entire forecasting period, I expect the EBIT margin to increase, within the first three years the strongest driven by a reduction in OPEX-to-sales ratio and a strong increase in the gross profit margin. This positive trend, I anticipate to continue until the end of the forecasting period in 2037, although at a slower pace, due to growth slow down and eventual decline in the gross profit margin beyond 2028, despite more pronounced improvements in the OPEX-to-sales ratio starting from 2029. By the end of the forecasting period, I expect the EBIT margin to reach 9.27%, as shown in *Table 3* on page 32, falling short of Puma's long-term goal of a 10% EBIT margin, a target the company initially set already in 2018 for 2025 (Dauer, 2024).

The projected long-term EBIT margin of 9.27% by 2037 is below that of Nike, which reported an EBIT margin of 11.33% in 2023 and even 15.58% in 2021 (Nike Inc, 2023). In contrast, Adidas's EBIT margin, significantly impacted by events such as the termination of the Yeezy contract in 2022, was only at 1.3% in 2023. However, in 2019, Adidas registered an EBIT margin of 11.3% (Adidas AG, 2023). Thus, in comparison to the EBIT margin potential seen for its two main competitors, Puma's EBIT margin planning is rather conservative but also reflects the substantial investments necessary for a relatively small player in terms of revenues compared to Adidas and Nike, to remain competitive and relevant within the highly dynamic sporting goods industry.

Table 3: (Expected) EBIT and EBIT margin development from 2023 to 2037

Year	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
EBIT in million €	622	655	765	876	964	1,033	1,097	1,158	1,216	1,271	1,320	1,366	1,409	1,450	1,488
EBIT Margin (EBIT / sales)	7.23%	7.33%	8.04%	8.56%	8.84%	8.93%	8.99%	9.05%	9.11%	9.15%	9.18%	9.20%	9.22%	9.25%	9.27%

Source: Own elaboration using Puma's financial data

In the next step, income taxes are subtracted from the EBIT to derive the **NOPAT**. For the purpose of calculating the FCFF, which aims to represent the cash flow available to all shareholders and debt holders (*see point 2.1.2.*), it's crucial to exclude the effects of debt structuring decisions and thus, use the EBIT and not the net income and multiply it by an estimated future income tax rate (Koller et al., 2020). To still accurately capture the total cash generated each year within the forecasting period, the impact of the financing structure on the tax calculation is considered in a separate computation (*see the tab "summary" attached excel file for more details*).

Given Puma's global presence determining an appropriate future income tax rate is challenging, as indicated in point 2.3. Simply using the domestic corporate or marginal tax rate from Germany, where Puma is headquartered, does not accurately reflect the tax liabilities incurred throughout its worldwide operations. Additionally, as my forecast anticipates changes in the regional revenue distribution, the tax obligations are also expected to vary in the future. One way to estimate the future income tax rate could involve weighting the aggregated current corporate tax rates of each region by their anticipated relative revenue contributions. However, this approach has a number of drawbacks. First of all, it requires detailed knowledge of revenues at the country level, which Puma does not disclose and thus, were not forecasted, making it difficult to accurately aggregate country tax rates to regional tax rates. Using the most recent GDP of each country relative to the total regional GDP as weights, presuming Puma generates more revenues in nations with higher GDPs and the relative share of each GDP would be constant over time, could be a possible workaround. However, even if this proxy would be accurate for aggregating country to regional tax rates, it does not address the issue that the aggregation of regional tax rates to one company-wide income tax rate would still be based solely on revenue shares rather than actual net income figures. Therefore, it would be assumed that the net income margins across all regions would be equal, which is unrealistic considering the differences in operational efficiencies and market conditions. Moreover, multinational corporations like Puma may legally move profits to countries with more favorable tax rates, complicating the prediction of effective tax rates. The potential future change for corporate tax rates, influenced by potential changes in government policies, adds another degree of complexity.

Given these challenges, using the effective tax rate disclosed in Puma's annual reports in the past provides a more straightforward and less subjective approach. By averaging the effective tax rate from 2019 to 2023, the concluded figure of 24.66%, as shown in *Annex N* accounts for Puma's actual historical tax profile and reduces the effect of annual volatility (Puma SE, 2023a). For simplicity and no other information available, this income tax rate of 24,66% is assumed to be the best proxy for the future tax rate and to remain constant over the forecasting period.

Consequently, the NOPAT for each year can be calculated by applying the constant income tax rate to the annual EBIT.

Following the determination of the NOPAT, the next step in the FCFF calculation involves adjusting for **non-cash operating expenses and revenues**, such as changes in pension provisions, gains and losses from the disposal of fixed assets and other non-cash non-operating expenses and revenues. However, given the significant variability and unpredictability of these items over the past five years, as evidenced in the cash flow statement of Puma reaching €17.1 million in 2023 and -€3.1 million in 2021—, their relatively low materiality and the absence of detailed information about past and potential future developments, these factors are not forecasted (except for changes in other current provision considered later in the NCNWC movements) and an amount of 0 over the forecasting period is assumed (*see Annex O*).

One major component of the future cash flows under the FCFF model is the company's **reinvestment needs**, which encompass net CAPEX and changes in non-cash net working capital.

For **CAPEX**, it's first crucial to note that the FCFF model only takes into account investments in owned fixed assets, such as property, plant, and equipment, as well as intangible assets, excluding leased assets. Under IFRS 16, leased assets are recognized as right-of-use assets, depreciated over the lease term, with corresponding lease liabilities recorded on the other side of the balance sheet (Puma SE, 2023a). These lease liabilities, which incorporate an interest component, are classified as debt and hence, are considered in the calculation of debt in the capital structure to determine the WACC and when deriving the equity value from the enterprise value (Damodaran, 2009a). Throughout the forecasting period, I project both right-of-use assets and corresponding lease liabilities to remain stable, indicating that the annual depreciation expense will consistently match the annual reinvestment in new leased assets. This trend, already observable from 2022 to 2023, serves as best proxy as Puma does also not provide any detailed information about future leases (Puma SE, 2023a). Additionally, it is important to be aware that in the past, currency changes have impacted the value of fixed assets and accumulated depreciation and amortization. However, these changes have affected both the gross value of fixed assets and the accumulated depreciation and amortization, almost netting each other out over the past five years from 2019 to 2023. As such, these currency changes are not forecasted, also due to both the lack of detailed information and their strong yearly volatility. For the investments in owned fixed assets in 2024, Puma has estimated spending approximately €300 million for improving its own distribution and logistics centers as well as for expanding and modernizing its retail stores and IT infrastructure (Puma SE, 2023a). Since no other information are available and historically, the planned investments of Puma have closely matched the actual expenditures, this figure is used as best estimate for CAPEX in 2024. Beyond this year, Puma has not disclosed specific investment plans. To estimate future capital expenditures, I analyzed the CAPEX-to-sales ratio for the past five years, including the projection for 2024. The ratio was 3.12% in 2022, 3.48% in 2023, and is projected at 3.35% for 2024, indicating a relatively stable pattern. For the period after 2024, I assume a gradual decline in the CAPEX-to-sales ratio by a factor of 0.995 for the first five years and by 0.99 for the subsequent years from 2029 to 2037 based on the premise that as Puma matures and scales its operations, it requires fewer relative

reinvestments in fixed assets. By the end of the forecasting period, the CAPEX-to-sales ratio is expected to reach 3% (*see Annex P*). Additionally, the projected ratio of 3.34% for 2025 falls within Puma's targeted range between 3% and 3.5% of sales for 2025 (Puma SE, 2024a).

For forecasting the **depreciation and amortization expense**, it is first important to point out that Puma also recognizes impairment expenses in its P&L, for goodwill and right-of-use assets. The goodwill in particular is not amortized but only subject to annual impairment testing (Puma SE, 2023a). Given the complexity of these tests and the lack of detailed disclosure by Puma, coupled with historically low impairment amounts, I project that there will be no impairments recorded over the forecasting period. Additionally, it is assumed that the goodwill will remain constant throughout the forecasting period, as it was the case for the past five years from 2019 to 2023 for Puma (Puma SE, 2019; Puma SE, 2021; Puma SE, 2023a). For the regular depreciation and amortization calculation, a distinction is made for existing and newly acquired fixed assets within the forecasting period. For existing assets, calculations are based on the remaining net book values of property, plant, and equipment (excluding construction in progress) and intangible assets (excluding goodwill) as of December 31, 2023, considering the estimated average remaining useful life in each category and assuming a declining balance depreciation and amortization schedule. The application of the declining balance method is based on the fact that, in reality, the remaining useful lives will vary significantly within each fixed asset category, and in 2024, some assets will already be fully depreciated and will therefore no longer be included in the depreciation and amortization expense in 2025 (*see the tab "CAPEX & Depreciation forecast" in the attached excel file for more details*).

The new investments for fixed assets are first allocated across the asset categories according to Puma's stated strategy of investing one-third in each of DTC stores, distribution centers, and digital infrastructure to determine the applicable useful life. Therefore, 33% of the total new investments is projected to be directed into intangible assets (digital infrastructure), 64% into buildings and machinery and equipment, and 2% into construction in progress (DTC stores and distribution centers). For the useful lives of these assets, the upper end of Puma's provided useful life ranges is assumed, such as depreciating buildings over 50 years rather than the shorter period of 10 years (Puma SE, 2023a). Hence, each year, the value of the newly acquired assets is divided by the applicable useful life, while accounting for the depreciation and amortization expense of the previous year and the remaining useful life, to ensure that no assets is reaching a net book value below 0. By the end of the forecasting period, the cumulative impact of depreciation and amortization on new investments, I expect to total approximately €384.2 million by 2037, starting from €26 million in 2024. The total depreciation and amortization for all assets, including those already existing as of 2023 and the new acquisitions during the forecast period, I project to reach €389.7 million by 2037 (*see Annex Q*), a significant increase from €142.5 million in 2023, leading to a lower net CAPEX at the end of the forecasting period (*see the tab "CAPEX & Depreciation forecast" in the attached excel file for more details*).

For forecasting the changes in **non-cash net working capital**, in the first step it is crucial to determine which components are considered operational, as mentioned in point 2.1.2. While core elements like inventory, trade receivables, and trade payables are essential parts of non-cash net working capital, it's unclear what other current assets and liabilities qualify as operational.

Although Puma annually discloses its "working capital" excluding cash & cash equivalents, the lack of a detailed breakdown and explicit mention of operational components presents challenges. Nevertheless, it offers a first starting point for identifying relevant components. In the end, I decided to consider, apart from the integral items, income tax receivables and liabilities, other current assets (comprising prepaid expenses and other receivables mainly related to VAT), and other current liabilities (which include liabilities from other taxes, mainly VAT, refund obligations, and payables to employees) as well as other current provisions (covering warranties, purchasing risks, litigation risks, etc.) due to their obvious operational nature. Based on these components, the non-cash net working capital for 2023 is calculated to be €1.183 billion, slightly above Puma's reported working capital of €1.177 billion. This discrepancy suggests that Puma also recognizes some parts of other current financial assets and liabilities, which I have classified as non-operational, in their working capital figure (Puma SE, 2023a).

While the most significant items in terms of value, inventory, trade receivables and trade payables are explained in detail, the forecast for the other components can be found in *Annex R* or in the tab "NCNWC forecast" in the attached excel file with more explanations. It's important to highlight that the movements in the items on the balance sheet historically have not directly aligned with the cash movements presented in Puma's cash flow statement, largely due to currency and valuation adjustments required by IFRS. For example, for the inventory, a cash outflow of only €747 million was recorded on the cash flow statement in 2022 due to overstocking, despite increasing by €752.9 million compared to the previous year 2021 according to the balance sheet (Puma SE, 2022). These discrepancies result from non-cash effective value adjustments applied to inventory, based on factors like age, seasonality, and realizable market prices, to match the reported inventory value with the lower of acquisition/manufacturing costs or net realizable values (Puma SE, 2023a). Due to the lack of detailed information about the nature of these adjustments and their non-cash character, which means they are typically accounted for in other sections of the cash flow statement to match the cash flow statement with the actual cash movements (possibly within adjustments for other non-cash operating expenses), these adjustments are not forecasted. Instead, it is assumed that the changes reflected on the balance sheets accurately represent actual cash movements, simplifying the forecasting process for non-cash net working capital components and allowing an integrated planning.

The forecast for inventory, trade receivables, and trade payables is based on historical inventory days, days of collection, and payment days, as this not only reflects the company's operational efficiency effectively but also links it directly to the forecasted sales or cost of sales. Additionally, it allows for a meaningful comparison with its main competitors Nike and Adidas using the same ratios and highlighting areas for potential improvement or competitive advantage. First, reviewing Puma's inventory days over the past three years from 2021 to 2023 reveals significant effects from fluctuating demand and overstocking, as mentioned, for instance, in point 4.1. In 2022, it took Puma an average of 179.52 days to sell its inventory coming from 153.49 days in 2021, which improved to 142.71 days in 2023, due to strong promotional activities that accelerated sales, as shown in *Annex S* (Puma SE, 2023a). This pattern is mirrored for instance in Adidas's inventory days, which decreased from 183.71 in 2022 to 146.89 in 2023 (Adidas AG, 2023). For 2024 and 2025, I project that Puma will further reduce its inventory days to 137.98

for both years due to ongoing, albeit reduced, promotional activities and more efficient inventory management, aiming for healthier inventory levels yet remaining higher than Nike's 106.68 days in 2023. By 2026, as extraordinary promotional efforts are reduced to 0, I expect a slight increase to 140.27 in inventory days due to slower sales conversion. Due to further efficiency gains in inventory management, in particular due to further investments in distribution centers, as stated in the CAPEX forecast, that compensate for the normalization of promotional activities starting from 2027 until the end of planning period, the days of inventory I anticipate to reach 137.95 days by 2037.

Second, the days of collection for trade receivables have seen an upward trend over the past five years, increasing from 40.58 days in 2019 to 47.46 days in 2023, due to extended customer payment terms, as visible in *Annex S* (Puma SE, 2023a). This collection period is significantly higher compared to Adidas and Nike, which reported 29.44 days and 32.47 days, respectively, in 2023, indicating a substantial opportunity for improvement for Puma (Adidas AG, 2023; Nike Inc., 2023). Although I anticipate a slight increase for 2024, I project a reduction in the days of collection by a factor of 0.99 for the following years until 2028. This factor I expect to sharpen to 0.985 for the remaining forecasting period as Puma continues to improve its receivable collection processes and adjusts the payment terms with customers, aligning with their long-term strategy goal of reducing the days of collections (Puma SE, 2024a). By the end of the forecasting period, I expect the days of collection to decrease to 40.19 days.

Third, the days of payment have experienced notable fluctuations over the past five years, ranging from 109.37 days in 2019 to a peak of 138.8 days in 2022 (*see Annex S*), consistently exceeding the maximum figures of competitors Adidas and Nike, which were only 94.69 days and 48.58 days, respectively, during the same period (Puma SE, 2023a; Adidas AG, 2023; Nike Inc., 2023). Looking forward, Puma aims to stabilize its payment days; thus, I anticipate that the 2024 figure will align closely with that of 2023 (Puma SE, 2024a). However, given the historically long payment terms, I forecast a gradual reduction in the days of payment throughout the forecasting period to enhance supplier relationships by ensuring slightly more competitive payment terms reaching 112.14 payment days at the end of the period.

Overall, including the forecast for the other NCNWC items and the anticipated improvements in inventory, trade receivables, and trade payables, I project that Puma will enhance its working capital efficiency, resulting in a reduction of the non-cash net working capital-to-sales ratio from 13.76% in 2023 to 13.2% by 2037 (*see Annex T*). Now that the NOPAT, net CAPEX, and non-cash net working capital changes have been computed for every year of the forecast, the FCFE across the entire planning period can be determined, as shown in *Table 4*.

Table 4: (Expected) FCFE development in million € from 2023 to 2037

Year	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
EBIT	622	655	765	876	964	1,033	1,097	1,158	1,216	1,271	1,320	1,366	1,409	1,450	1,488
-Income taxes (24,66%)	153	162	189	216	238	255	270	285	300	313	325	337	347	357	367
NOPAT	468	494	576	660	726	779	826	872	916	958	994	1,029	1,061	1,092	1,121
-CAPEX	-300	-300	-318	-340	-361	-380	-397	-412	-426	-439	-450	-460	-468	-476	-482
+ Depreciation & Amortization	143	167	190	209	230	259	254	252	288	326	337	351	365	378	390
+/- Change in non-cash net working capital	-74	-19	-84	-126	-87	-84	-72	-68	-64	-61	-58	-56	-54	-52	-51
FCFE	237	342	365	403	508	573	612	645	714	784	823	865	905	942	977

Source: Own elaboration using Puma's financial data

Driven by an increasing NOPAT, declining net CAPEX, and more efficient non-cash net working capital management, the FCFF are projected to increase over the forecasting period.

It is crucial to note, that these calculated FCFF are not comparable to the free cash flows disclosed by Puma in its annual reports, as the company includes additional items and valuation impacts, and employs different calculations, for instance, for tax payments (Puma SE, 2023a).

4.4. Estimation of terminal value

Beyond 2037, I assume that Puma will reach a steady state, characterized by a stable growth rate in the FCFF across the entire company. This assumption is particularly challenging for multinational enterprises like Puma, which experience varying growth rates across different segments and regions, as mentioned in point 2.3. To reduce this complexity, I chose a lengthy 14-year forecasting period, leading to an overall expected sales growth rate of 2.35%, with segment-specific growth rates of 2.65% for footwear, 2.03% for apparel, and 1.71% for accessories at the end of the period 2037, as shown in *Table 1* on page 24. Since the anticipated growth rates are very low and similar for all segments by 2037, they allow a smooth transition into the terminal value phase.

To determine the terminal value, in the first step the appropriate growth rate (g) that the company is expected to sustain indefinitely beyond the forecast period has to be established. Given the extensive forecasting period covered in this analysis, a unified growth rate for the entire company is applied post-2037, assuming that all segments and regions will continue to grow at a similar rate. Considering multiple growth rates would also not be possible, as the FCFF were not entirely forecasted on segment or regional level. An initial estimate of g can be derived by multiplying the estimated reinvestment rate by the return on invested capital (ROIC) for the entire company as of 2037, as stated in point 2.1.2. The reinvestment rate is calculated by dividing the sum of net CAPEX and changes in non-cash net working capital by the NOPAT for the year 2037. Over the forecasting period it can be seen that the reinvestment rate decreases, reflecting reduced capital needs as the company matures, reaching 12.8% in 2037 (*see Annex S*). However, calculating ROIC is more complex. It involves projecting invested capital, which, following Aswath Damodaran's definition, equals the book value of debt (including borrowings and lease liabilities) plus equity minus cash reserves, calculated through to 2036—the year preceding 2037 (Damodaran, 2009a). Therefore, an integrated financial planning over the planning period was made that forecasted the entire balance sheet and profit and loss statement, including assumptions about the proportion of CAPEX financed through borrowing, debt repayment schedules, and dividend payouts, among other things (*see the tabs “summary” and “financial debt & equity forecast” in the attached excel file for more details*), which in turn also influence the cash balances, apart from non-cash net working capital movements. For 2037, this led to a return on invested capital of 17.68%, resulting in a growth rate g of 2.26%, when multiplying the ROIC with the reinvestment rate of 12.8% (*see Annex U*).

To ensure a realistic estimate for the growth rate, it is scrutinized against the long-term regional real GDP growth rates, where Puma operates. Unfortunately, specific future regional GDP growth data starting from 2037 for Puma's operating regions is not available, thereby preventing a detailed aggregation of the regional GDP rates that mirrors Puma's anticipated global presence by 2037. Given this lack of region-specific growth rates and considering that Puma's presence

spans some of the largest global economies, a broader and more generalized measure was adopted using the global real GDP growth rate. This approach utilizes the OECD's long-term real GDP forecast from 2023 until 2060, which anticipates a total growth of 125.32% for all OECD and G20 countries, translating to an average annual average growth of 3.39% (OECD, n.d.). Specifically, from 2040 to 2060, close to the end of the forecasting period by 2037, a total growth of 45.66% is expected, resulting in an average annual growth rate of 2.28% (*see the tab "OECD Long-term GDP forecast" in the attached excel file for more details*). Both the expected annual global growth rate from 2023 to 2060 and from 2040 to 2060 surpass the calculated g of 2.26% for Puma, ensuring adherence to the guideline that the company's growth rate should not exceed the overall GDP long-term growth. Furthermore, as another cautionary step outlined in point 2.1, Puma's growth rate is also verified against the risk-free rate of 2.53% (*see point 4.5.*), which also surpasses the estimated g of 2.26%. For added conservatism and to account for potential unforeseen long-term economic fluctuations, a lower growth rate of 2% is assumed for the terminal value calculation, aligning with most of the analyst growth rates ranging from 2% to 2.5% (J.P. Morgan, 2024; RBC Europe Limited, 2024; Hauck & Aufhäuser Investment Banking, 2024). However, to analyze the impact of different growth rates and WACCs on the overall estimated share price, a sensitivity analysis is performed in point 4.9. Equipped with the growth, reinvestment and the income tax rate, the FCFF for 2038 can be determined by multiplying the EBIT of 2037 with $(1 - \text{reinvestment rate})$, $(1 - \text{income tax rate})$ and $(1 + \text{growth rate})$, forming the basis for the terminal value calculation and leading to a FCFF of €997 million in 2038.

4.5. Estimation of cost of capital

In order to calculate the terminal value and the present value of all forecasted FCFF including the terminal value, the cost of capital, using the WACC approach, have to be determined.

First, the more complex to determine **cost of equity** are estimated using the CAPM. As outlined in point 2.1.2., the first needed input is the risk-free rate. Given that Puma is based in Germany and the forecast of the FCFF were made in Euro, the yield of a 10-year German government bond serves as a suitable proxy for the risk-free rate, ensuring consistency without increasing the complexity by using multiple risk-free rates. As of June 12, 2024, this rate was approximately 2.53%, which is preferred over the yield of 2.02% at the end of 2023, as it more accurately reflects the expected future risk environment (Investing.com, n.d.).

Next the unlevered and levered beta for Puma have to be calculated. To accurately assess varied market dynamics, risks and sales growth rates across the three main product segments- footwear, apparel and accessories-, as projected over the forecasting period, I utilized three different industry-specific unlevered betas, which were later on weighted by the (expected) revenue shares, levered and (bottom-up) aggregated. These betas were obtained from the website of Aswath Damodaran for Western Europe, updated in January 2024 and are based on a compilation of peer company betas, using a simple average of firm betas calculated from both 2-year and 5-year weekly return regressions, with a heavier weighting on the more recent 2-year data (Damodaran, n.d.-a). While 110 companies were included for the apparel segment, the footwear segment analysis was based on a smaller sample of only 10 companies (Damodaran, n.d.-b). Although not all included firms may be perfect peer companies for Puma, they offer valuable

insights into the overall industry volatility, helping to estimate the market risks Puma might face in these product segments. Due to the absence of an industry-specific beta for the accessories segment and its relatively low weight based on the relative revenue contribution, which is expected to even further decline over the forecasting period, an unlevered beta of 1 was assumed, implying that this segment aligns with the overall market's volatility. Given that Damodaran's excel file offers a variety of beta values, selecting the most relevant one is crucial. The chosen betas for the footwear and apparel segment for this analysis are unlevered by the total debt-to-equity ratio of the entire industry, including lease liabilities, the market value of equity and an average effective tax rate. It is important to note that the definition of the debt-to-equity ratio applied by Damodaran aligns with the one that is later used to calculate the WACC, ensuring a coherent approach. Additionally, the two industry betas were corrected for cash holding since the standard unlevered beta reflects the beta of the entire company, including cash reserves, which must be removed to isolate the beta associated purely with industry risk calculated as $\text{Unlevered Beta} / (1 - \text{Cash}/\text{Firm Value})$. While for the footwear segment an unlevered beta of 1.08 was obtained from file of Damodaran, the apparel segment's beta amounted 0.93 (Damodaran, n.d.-a).

When trying to lever the industry betas for Puma's segments, a challenge arose from the lack of segment-specific financial data. Puma does not provide breakdowns of the debt and equity figures by segment, but instead only discloses them at company level. Therefore, I assumed that the debt-to-equity ratio, using market values for both debt and equity, is consistent across all segments. The market value of Puma's equity, derived from its market capitalization as of December 31, 2023, equaled €7,569,916,800. For the debt, including borrowings and lease liabilities, which is not publicly traded, the book value as of the same day was used as a proxy. With an amount of €1,804,400,000 for the total debt, this resulted in a company-wide debt-to-equity ratio of 23.84% (Puma SE, 2023a). Applying this ratio along with the effective tax rate of 24.66% to each segment, the levered betas calculated are 1.27 for footwear, 1.10 for apparel, and 1.18 for accessories.

To calculate Puma's overall company beta, it's essential to aggregate the three levered betas. Unlike some traditional approaches, such as the one Damodaran (2009a) suggests, which use the relative operating income from the most recent fiscal year for weighting, I opted for a more forward-looking method. I utilized the revenue share of each segment not only from the most recent year, 2023, but also incorporated projected revenue share developments over the forecasting period up to 2037, by averaging these shares over the period from 2023 to 2037. This approach ensures that the calculated company beta accurately reflects both current and anticipated future dynamics of each segment and resulted in weights of 56.77% for footwear, 30.02% for apparel, and 13.21% for accessories. By applying these weights to the respective levered betas, I calculated an aggregated company beta of 1.21 (*see Annex V*).

In the next step of estimating Puma's total cost of equity via the CAPM, the levered beta is multiplied by the expected market or equity risk premium. This premium I broke down into two main components, that arise when investing into Puma: Firstly, the standard market risk premium for investments in developed markets represented by the excess return investors seek from the market index relative to a risk-free asset. Using the MDAX, where Puma is listed, I determined

the average annual return over the past ten years from the beginning of 2014 up to the end of 2023, which was 6.43% (Finanzen.net., n.d.-a). Subtracting the same risk-free rate from above of 2.53% yields an excess return of 3.9%, which I assume to be similar in the future. Secondly, due to Puma's multinational operations, an additional risk factor must be considered. The company's significant exposure to volatile emerging markets, where it is subject to adverse economic events, such as the Argentine peso's devaluation in 2023, necessitates a higher risk premium to account for these elevated risks relative to more stable markets (Puma SE, 2023a). To quantify these risks, I used Aswath Damodaran's data on country risk premiums updated as of January 1, 2024, which leverages the latest local currency sovereign ratings from Moody's to estimate the default spreads for every country. To convert the default spreads into country risk premiums for equity investors, Damodaran multiplies the default spread by a ratio of the standard deviation of the S&P Emerging Market Equity Index to that of the iShares Emerging Market Bond Index for a five-year period (June 30, 2018 - June 30, 2023), which is 1.34. This ratio accounts for the increased risk associated with equity investments compared to bond investments in emerging markets, providing a more accurate reflection of the additional return required by investors for taking on equity risks in these potentially unstable regions (Damodaran, n.d.-c).

However, the process of weighting and aggregating the country risk premiums to determine a unified company risk premium for Puma is complicated by the lack of specific data about the exact countries in which the company operates and their respective revenue contributions. As Puma only provides regional revenue figures, the available country risk premiums—which vary significantly—must be aggregated into regional risk premiums that align with Puma's reported regions. A simplistic average of all country risk premiums within a region would not accurately reflect Puma potential greater revenue generation and risk exposure in economically larger countries. For instance, Puma is likely generating more revenue in Brazil compared to Uruguay in Latin America, a fact overlooked by a simple arithmetic average. Instead, a more precise approach was adopted where the revenue distribution within a region is assumed to mirror the relative GDPs of the countries involved, thus addressing the concerns mentioned above. Weighted according to the 2022 GDP figures in billion US dollars, the country risk premiums were then aggregated to derive risk premiums at regional level, aligning with Puma's disclosed regions in the segment reporting (*see Annex W*). For the “Stichd” entity, which is operating globally, the global risk premium was applied.

With the regional risk premiums established, they can then be weighted by the revenue figures for each region as disclosed by Puma. To calculate these weights, I applied a forward-looking approach similar to that used for the industry betas. Therefore, I considered both the most recent year's (2023) revenue distribution and my future revenue share projections for each region until the end of the planning period, by averaging the revenue shares from 2023 to 2037, to reflect the anticipated changes in Puma's regional risk exposures. Using these weights for the regional risk premiums, I obtained an overall company risk premium of 2.47%, which reflects the additional risk arising from Puma's multinational operations (*see Annex X*). By combining this with the risk associated with investing in a stable market index, the overall market risk premium for Puma was estimated at 6.37%. With all components now determined, the CAPM formula can be applied, resulting in an expected cost of equity for Puma of 10.23%, as presented in *Table 5*.

Table 5: Estimation of cost of equity

Estimation of cost of equity	
Unlevered beta	1.03
Levered beta	1.21
Risk-free rate	2.53%
Equity risk premium	6.37%
Cost of equity	10.23%

Source: Own elaboration using Damodaran's data

Lastly, the cost of debt has to be estimated in order to obtain Puma's total cost of capital. A commonly used method in practice involves dividing the total interest expense by the average total debt. However, for Puma in 2023, this approach results in a cost of debt of 5.94%, much higher than the reported effective interest rate of Puma in 2023 due to additional costs from derivative financial instruments, which bias the calculated figure (Puma SE, 2023a). Instead, as suggested in point 2.1.2. and following Damodaran's method, a more theoretical approach is employed. This method estimates the cost of debt based on the risk-free rate and an estimated default spread to reflect the expected return that lenders would demand rather than the actual costs incurred by Puma. To estimate Puma's default spread, the credit rating of the company has to be known. Since Puma lacks such a rating from agencies like Standard & Poor's, Moody's, or Fitch, I used Adidas's A- rating from S&P from December 2023 as most suitable proxy (Adidas AG, 2023). Based on this rating, a default spread of 1.21% was retrieved from Damodaran's database updated on January 2024 of credit spreads (Damodaran, n.d.-d). Combining this default spread with the risk-free rate of 2.53% results in a pre-tax cost of debt of 3.74%. To reflect the tax deductibility of debt, this figure was adjusted by Puma's effective tax rate of 24.66%, resulting in an after-tax cost of debt of 2.82%, as shown in Table 6.

Table 6: Estimation of after-tax cost of debt

Estimation after-tax cost of debt	
Risk-free rate	2.53%
Default spread for A- rated company	1.21%
Pre-tax cost of debt	3.74%
Effective income tax rate	24.66%
After-tax cost of debt	2.82%

Source: Own elaboration

Using the previously established debt-to-equity ratio of 23.84%, the calculated WACC for Puma is equal to 8.81% (see Table 7), which falls within the range commonly estimated by analysts for Puma between 8% and 10% (J.P. Morgan, 2024; RBC Europe Limited, 2024; Hauck & Aufhäuser Investment Banking, 2024).

Table 7: WACC & terminal growth assumptions for DCF valuation

WACC/ Terminal growth assumptions	
After-tax cost of debt	2.82%
Cost of equity	10.23%
Book value of debt as of 31.12.2023	1,804.4
Market value of equity as of 31.12.2023	7,569.92
Debt-to-equity ratio	23.84%
WACC	8.81%
Terminal growth rate	2%

Source: Own elaboration

4.6. Estimation of enterprise and equity value

In the last step of the FCFF approach, this WACC is applied as the discount rate for the FCFF over the forecasting period and for calculating the terminal value at the end of this period. Based on a stable growth rate (g) of 2%, the terminal value in 2037 is calculated to be €14,646 million. The present values of the FCFF during the visible forecasting period and the terminal value as of December 31, 2023, are €4,768 million and €4,493 million respectively, as shown in *Table 8 and 9*.

Table 8: Present value of FCFF over the planning period and terminal value in million €

Year	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	Terminal value
FCFF in million €	342	365	403	508	573	612	645	714	784	823	865	905	942	977	14,646
Discount factor	0.919	0.845	0.776	0.713	0.656	0.603	0.554	0.509	0.468	0.430	0.395	0.363	0.334	0.307	0.307
Present value in million €	314.05	308.20	312.52	362.55	375.50	368.76	357.11	363.37	366.76	353.96	341.86	328.68	314.59	299.83	4,493.25

Source: Own elaboration

Thus, the total enterprise value of Puma equals €9,261 million. To derive the equity value as of December 31, 2023 from the enterprise value, the total debt (including borrowings and lease liabilities) and non-controlling interests are deducted, while adding back cash as of 31.12.2023. The non-controlling interests have to be subtracted to reflect only Puma's attributable value since they represent the equity stakes held by external shareholders in Puma's subsidiaries (Puma SE, 2023a). The total adjustment amounts to -€1,280.4 million, resulting in an equity value of €7,980.6 million for Puma as of December 31, 2023. As Puma had 149,840,000 share outstanding at the date, the average fair value per share is equal to €53.26 (*see Table 9 on page 43*).

Additionally, an estimation of Puma's target price for December 31, 2025, was undertaken that is later compared to the target prices of analysts for this date. First, the enterprise value as of December 31, 2025, was estimated based on all projected FCFF starting from 2026 as year 1 and using the same WACC of 8.81%, resulting in a value of approximately €10,227 million. Through an integrated financial forecast, the expected cash, debt, and minority interests as of December 31, 2025, were estimated (*see Annex Y and the "summary" in the attached excel file for more details*), leading to an adjusted equity value of €8,977 million after accounting for adjustments totaling -€1,250 million.

To take into account that Puma initiated a share buyback program in March 2024, using up to 10% to 25% of the annual consolidated net income with a cap of €100 million for the first tranche, to be completed by May 6, 2025, an adjustment for the number of outstanding shares as of December 31, 2025, was necessary (Puma SE, 2024d). Assuming Puma allocates 15% of its yearly net income to this buyback at an average share price of €50, approximately 1,944,074 shares are expected to be repurchased in 2024 and 2025, reducing the outstanding shares to 147,895,926. This adjustment raises the per-share value, leading to a target price of €60.7 per share as of December 31, 2025 (*see Table 9 on page 43*).

Table 9: DCF valuation output as of 31.12.2023 and 31.12.2025

	DCF valuation output	
	As of 31.12.2023	As of 31.12.2025
Present value visible period in million €	4,767.74	4,907.78
Present value terminal value in million €	4,493.25	5,319.49
Enterprise value in million €	9,261.00	10,227.26
<i>Equity valuation bridge</i>	<i>As of 31.12.2023</i>	<i>As of 31.12.2025</i>
Less: Current and non-current debt (including borrowings and lease liabilities) in million €	-1,804.4	-1,850.0
Less: Non-controlling interests in million €	-28.9	-56.7
Add: Cash and cash equivalents in million €	552.9	656.9
Total adjustments in million €	-1,280.4	-1,249.9
Equity value in million €	7,980.6	8,977.4
Number of shares outstanding in million	149.8	147.9
Equity value per share in €	53.26	60.70

Source: Own elaboration

4.7. Comparison of results with earnings multiple valuation

To better understand and validate the results derived from the DCF analysis for Puma, it is crucial to employ an alternative valuation method. For this purpose, the most widely utilized technique in financial practice, relative valuation, specifically the application of earnings multiples, is used. The foundation of relative valuation is the "law of one price", according to which similar assets should have similar prices (Koller et al., 2020; Fox et al., 2013). Hence, this market-oriented approach determines the fair value of a target company based on the market prices or stock market values of comparable companies. To ensure an accurate comparison, these peer companies should have close similarities to the target and be subject to "correct" valuation (Fox et al., 2023).

For a global company like Puma, however, finding comparable companies poses significant challenges, similar to those faced in DCF valuation. Puma's diverse presence across various markets and product segments, each with distinct growth characteristics, complicate straightforward comparisons. The most precise approach in this case would be a sum-of-the-parts valuation, where the company is divided into its several business units. Each unit is then valued based on the average multiple for financial metrics such as revenues, NOPAT, or EBITDA of similar publicly traded companies (Damodaran, 2009a).

For the purpose of this thesis, the relative valuation method is utilized only as a supplementary tool to deepen the understanding of the DCF results, not as the primary analytical focus. Therefore, it is assumed for simplicity that there are comparable firms with similar cash flow, growth, and risk profiles. This assumption is also necessary because detailed earnings figures below the gross profit line for Puma are only available at regional level, which include substantial centralized costs and not at business segment level. Additionally, employing revenue multiples, which could be applied at business segment level, is considered inappropriate for the current stage of the company. The primary earnings multiple that is focused on is the Enterprise Value, defined as market value of equity + total debt (including lease liabilities) – cash, to EBITDA (EV/EBITDA) multiple, as it negates the effects of different capital structures and non-operating items on the income statement (Koller et al., 2020). Nevertheless, the commonly used Price-to-Earnings (P/E) ratio is also referenced for comparison.

As comparable company to Puma for relative valuation, Adidas is selected, since both companies operate in the sporting goods industry, share similar market distributions globally, have

comparable product segment mixes, and are headquartered in the same city in Germany. While ideally, the denominator in valuation multiples should use forecasted, normalized profits to align with the principle that valuation is future oriented, Adidas lacks forecasted earnings data, prompting the use of historical 5-year multiples for comparison (Koller et al., 2020; Meitner, 2006). The EV/EBITDA multiple for Adidas fluctuated significantly during the last five years from 15.16 in 2022 to 30.51 in 2020, as shown in *Table 10* (Adidas AG, 2023).

Table 10: Adidas EV/EBITDA and P/E multiple from 2019 to 2023

Adidas	31.12.2019	31.12.2020	31.12.2021	31.12.2022	31.12.2023
EBITDA in million €	3,845	1,967	3,066	1,874	1,358
Market value of equity in million €	56,792	58,110	48,512	22,756	32,882
Total debt (borrowings + lease liabilities) in million €	4,770	5,890	5,331	6,459	5,563
Cash in million €	2,220	3,994	3,828	798	1,431
Total enterprise value in million €	59,342	60,006	50,015	28,417	37,014
EV/EBITDA multiple	15.43	30.51	16.31	15.16	27.26
Number of outstanding shares in million	195.969	195.066	191.595	178.537	178.549
Share price in €	289.80	297.90	253.20	127.46	184.16
Basic earnings per share from continuing and discontinued operations (in €)	9.70	2.31	7.47	3.34	-0.42
P/E multiple	29.88	128.96	33.90	38.16	-438.48

Source: Own elaboration based on Adidas' financial data

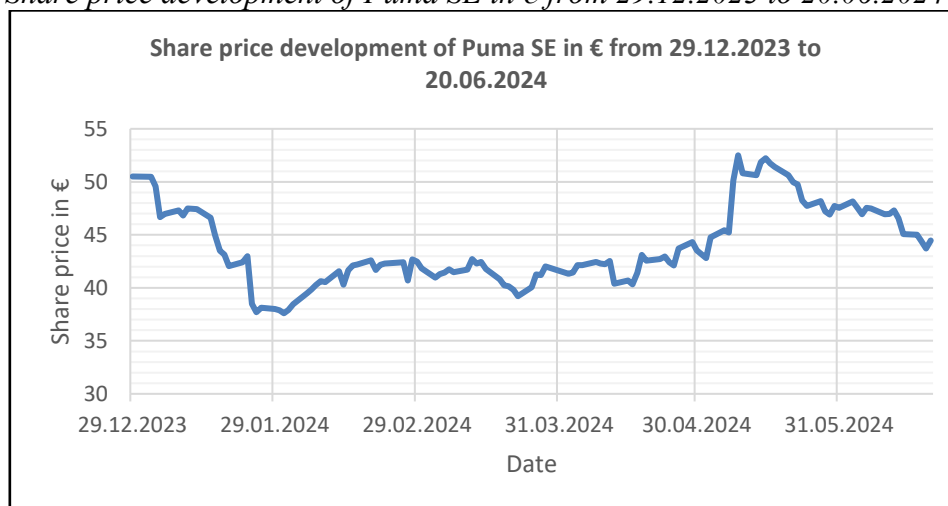
By contrast, Puma's EV/EBITDA multiple for 2023, based on the estimated enterprise value from the DCF analysis as of 31.12.2023 minus cash, at 9.01, is substantially lower than Adidas's minimum in the last five years (*see Annex Z*). This lower multiple implies that, compared to Adidas, every euro invested in Puma buys a larger share of profits, potentially indicating that the market views Puma as either undervalued or as having lower growth prospects, higher risks, or less operational efficiency. Similarly, Puma's 2023 P/E ratio, derived from the DCF-based share price of €53.26 as of 31.12.2023, is also lower at 26.24 than Adidas's five-year low of 29.88. To deepen the analysis of Puma's valuation, its multiples have been compared with those of its main competitor in the US, Nike, as well as with industry averages for 2023. Both Nike's EV/EBITDA multiple at 24.5 and P/E ratio at 31.41 for the fiscal year 2023 are significantly higher than those of Puma (*see Annex Za*) (Nike Inc., 2023). Puma's EV/EBITDA multiple also remains lower when compared to the industry averages for the footwear and apparel segment based on Damodaran's industry data for 2023, updated as of January 5, 2024 for Western Europe at 18.42 and 13.51, respectively (Damodaran, n.d.-e). This further supports the assumption that Puma's earnings per euro are cheaper compared to its peers and industry averages, potentially suggesting an undervaluation by the market.

However, when interpreting valuation multiples, caution is necessary due to their time-specific and backward-looking nature. Additionally, for an MNE like Puma, the comparability with other companies is particularly limited due to the unique operational scope and multi-market and multi-business presence, as mentioned above. Overall, a thorough DCF analysis offers a more precise way to capture the present value of future growth prospects, though it involves a higher level of complexity compared to the straightforward application of multiples.

4.8. Comparison of results with actual share prices

As a publicly listed company, Puma's shares are traded on the MDAX, providing a market price that reflects the value the market assigns to the company at any given time, influenced by supply and demand dynamics. This market price allows for an additional comparison, apart from the multiple valuation, of how the market valued the company relative to my valuation as of December 31, 2023. Due to differing expectations about future developments, company valuations can vary significantly among market participants (Damodaran, 2002).

Figure 3: Share price development of Puma SE in € from 29.12.2023 to 20.06.2024



Source: Own elaboration based on finanzen.net data (Finanzen.net., n.d.-b)

The first thing to note, when comparing the derived share price of €53.26 as of December 31, 2023, from my DCF analysis to the actual share price of €50.52 at the same day, is that they are very close to each other (Puma SE, 2023a). The difference of €2.74 per share suggests a slight undervaluation by the market, potentially indicating that the market may underestimate the long-term growth and profit potential of Puma. Instead, the market might be overly focused on short-term challenges such as recent leadership changes, with Arne Freundt taking over as CEO after the successful previous CEO Björn Gulden moved to Adidas at the start of 2023 and the impact of currency devaluation of the Argentine peso, potentially overlooking the company's robust foundational strengths (Puma SE, 2023b). Puma's opportunity to expand in major sporting goods markets like the US and China where its market share is relatively smaller compared to competitors like Adidas and Nike, along with its position as a market leader in the rapidly growing Indian market, underscores its substantial growth potential. This is further supported by Puma's innovative product launches, strong partnerships in sports and entertainment, and continuous digital initiatives, such as the expansion of its shopping app, among other things. A potential undervaluation was also revealed, when comparing Puma's earnings multiples, as done in point 4.7., with those of its peers and industry averages, which are generally higher than Puma's.

However, it's crucial to recognize that the share price of Puma as of December 31, 2023, was based solely on financial information available up to Q3 2023, while my DCF analysis incorporated financial data from FY 2023 and Q1 2024. Valuations are always limited by the data available at the time of valuation and may change as new information becomes accessible.

For instance, the publication of Puma's FY 2023 results on January 24, 2024, which included a conservative outlook for 2024 and the significant financial impact of the Argentine peso's devaluation, sparked fears of potential market share losses following the leadership transition, leading to a sharp decline in the share price to €38.49. However, following the release of the better-than-expected results for Q1 2024, the share price rebounded to €52.5 by May 9, 2024, only to fall again to €45.06 by June 14, 2024, as shown in *Figure 3* (Finanzen.net., n.d.-b). This pattern illustrates how the frequently volatile and not totally rational short-term market reactions might differ from the intrinsic values computed by techniques like DCF.

4.9. Sensitivity analysis

It is important to note that when evaluating the obtained share price of €53.26 for Puma as of December 31, 2023, and the target price of €60.7 for December 31, 2025, from my DCF analysis, the results strongly depend on the selected fundamental parameters, such as the WACC or the assumed terminal growth rate, which are in the case of Puma 8.81% and 2%. Even little changes to these parameters can significantly impact the drawn financial conclusions, as illustrated in various analyst reports that often apply differing growth rates and WACCs for Puma between 8% and 10%, leading to different recommendations whether to buy, hold, or sell Puma's stock (RBC Europe Limited, 2024; Hauck & Aufhäuser Investment Banking, 2024). To better understand and demonstrate how minor adjustments can affect the estimated share price, a sensitivity analysis is performed, in which the WACC from 8% to 10% and the terminal growth rate from 1.75% to 3% are adjusted at 0.25 percentage point intervals.

It can be immediately seen in *Table 11* on page 47, that even a change of only 0.44 percentage points in the used WACC to 9.25%, assuming the same growth rate of 2%, results in a share price of €48.92 as of December 31, 2023. This is below the actual market price on that day, highlighting how such small adjustment can affect the valuation outcome and the perception of whether a company is under- or overvalued.

This is further supported by contrasting the analyst reports from JP Morgan, RBC Capital Markets, and Hauck Aufhäuser Investment Banking. JP Morgan and RBC Capital Markets use a WACC of 10% and growth rates of 2% and 2.5% respectively, resulting in target prices for both of €47 as of December 31, 2025. Conversely, Hauck Aufhäuser Investment Banking, applying a lower WACC of 8% and a growth rate of 2.5%, anticipates a significantly higher target price of €70 (J.P. Morgan, 2024; RBC Europe Limited, 2024; Hauck & Aufhäuser Investment Banking, 2024). My sensitivity analysis for the estimated share price as of 31.12.2025 confirms these findings, leading to similar results as the analysts. A WACC of 8% and growth rate of 2.5% yields a fair value of €75.26 for Puma's share as of December 31, 2025, while a WACC of 10% with growth rates of 2% and 2.5% results in target prices of €49.37 and €51.3 respectively, as reflected in *Table 12* on page 47. The estimated fair value of Puma's share of €60.7 as of December 31, 2025, derived from my DCF analysis using a WACC of 8.81% and a growth rate of 2%, is close to the average target price of €59.71 for the same day as reported by MarketWatch as of 01.07.2024 based on 21 analyst reports (MarketWatch, n.d.).

Overall, the findings clearly demonstrate the importance of carefully choosing and justifying the parameters used in DCF valuation models, particularly the WACC and growth rate. Therefore, every valuation should be critically questioned based on these fundamental assumptions,

especially since most analysts use a standardized WACC that might not precisely reflect the unique characteristics and risk profile of a specific company like Puma.

Table 11: Share price in € as of 31.12.2023 depending on the WACC and growth rate

		WACC								
		8.00%	8.25%	8.50%	8.81%	9.00%	9.25%	9.50%	9.75%	10.00%
Terminal growth rate (g)	1.75%	61.26 €	58.18 €	55.33 €	52.13 €	50.25 €	47.97 €	45.84 €	43.85 €	41.99 €
	2.00%	62.86 €	59.61 €	56.62 €	53.26 €	51.30 €	48.92 €	46.70 €	44.64 €	42.71 €
	2.25%	64.60 €	61.16 €	58.01 €	51.95 €	52.42 €	49.93 €	47.63 €	45.48 €	43.47 €
	2.50%	66.49 €	62.85 €	59.51 €	53.16 €	53.63 €	51.03 €	48.61 €	46.37 €	44.28 €
	2.75%	68.57 €	64.69 €	61.15 €	54.47 €	54.94 €	52.20 €	49.67 €	47.33 €	45.15 €
	3.00%	70.85 €	66.70 €	62.94 €	58.77 €	56.36 €	53.47 €	50.82 €	48.36 €	46.08 €

Source: Own elaboration

Table 12: Share price in € as of 31.12.2025 depending on the WACC and growth rate

		WACC								
		8.00%	8.25%	8.50%	8.81%	9.00%	9.25%	9.50%	9.75%	10.00%
Terminal growth rate (g)	1.75%	69.08 €	65.80 €	62.76 €	59.34 €	57.33 €	54.90 €	52.62 €	50.49 €	48.49 €
	2.00%	70.97 €	67.50 €	64.30 €	60.70 €	58.59 €	56.04 €	53.67 €	51.45 €	49.37 €
	2.25%	73.02 €	69.34 €	65.95 €	62.16 €	59.95 €	57.27 €	54.79 €	52.47 €	50.30 €
	2.50%	75.26 €	71.34 €	67.75 €	63.74 €	61.41 €	58.60 €	55.99 €	53.56 €	51.30 €
	2.75%	77.71 €	73.52 €	69.70 €	65.45 €	62.98 €	60.02 €	57.28 €	54.73 €	52.37 €
	3.00%	80.41 €	75.92 €	71.83 €	67.31 €	64.69 €	61.56 €	58.66 €	55.99 €	53.51 €

Source: Own elaboration

5. CONCLUSION

In this thesis, a comprehensive literature review was conducted alongside the collection of both quantitative and qualitative data for a case study of the multinational sporting goods company Puma SE to investigate the unique DCF valuation challenges faced by MNEs such as Puma, formulate practical solutions for them, and offer a comprehensive DCF valuation framework.

Throughout the entire case study, these challenges were revealed, and practical solutions to navigate these complexities were suggested. The main findings are summarized in the last section of this thesis, divided into theoretical implications in relation to existing literature on the subject and practical implications. Lastly, acknowledging that every valuation model, including this DCF analysis, is based on multiple assumptions reflecting the analyst's perspective, the limitations of this model are outlined, along with recommendations for further enhancing accuracy and applicability in future research and practical implementations.

5.1. Theoretical Implications

While there is extensive literature on the general DCF valuation of single-business domestic companies, it is surprising that only a few articles specifically address the additional complexities arising in the DCF valuation of multinational entities, despite their increasing number and influence. This oversight may stem from the fact that many researchers and practitioners, out of simplicity and a lack of understanding of the importance of these specifics, do not account for the unique characteristics of multinational companies. Instead, they often tend to follow a

standard aggregated approach with conventionally estimated cost of capital for all companies including MNEs. However, this can lead to significantly erroneous conclusions as pointed out in this master's thesis. The most prominent work in the subject of DCF valuation for MNEs is a single article by Damodaran (2009a), which dates back to 2009 and focuses on valuing the multinational United Technologies Corporation, a U.S.-based producer of technology products. This article is used to compare against my main findings derived from the application of the FCFF approach to Puma SE, to better understand and highlight my contribution to this field:

Before applying the FCFF approach to an MNE like Puma, some fundamental decisions had to be made regarding the selected currency, the length of the forecasting period, and the type of approach (aggregated vs. disaggregated).

For Puma, operating in various countries with multiple currencies, the logical choice, as suggested by Damodaran (2009a), was to use the euro, consistent with its headquarters in Germany and its reporting currency. This selection also dictated the choice of the 10-year German government bond yield as the risk-free rate, ensuring uniformity with the currency used. However, it was crucial to take into consideration expected currency volatility in the FCFF and cost of capital calculations by adjusting, for instance, forecasted revenues in € and incorporating country risk premiums in the cost of equity.

To account for the different growth characteristics of Puma's three product segments, I chose a longer forecasting period of 14 years, compared to the five years chosen by Damodaran (2009a) for United technology Corporation, to ensure that all segments reached a steady state and hence, allowed a smooth transition to the terminal value phase.

While Damodaran (2009a) in his article only differentiates between using an aggregated and disaggregated approach to forecast the entire FCFF, I combined both in my integrated planning DCF valuation model for Puma. Although Damodaran is theoretically correct that a fully disaggregated approach to forecast the FCFF at business segment, regional or even business segment and regional level would yield the most accurate results, this approach requires comprehensive information to conduct the forecast precisely, which is often unavailable. In Puma's case, significant limitations in past data, due to non-existence of data or an unclear allocation of highly centralized costs and uncertain future expectations, particularly regarding non-cash net working capital and CAPEX at regional or business segment level, make a fully disaggregated approach impractical. This would lead to a false precision, involving multiple subjective and unclear assumptions. A more sophisticated model does not necessarily yield better results but may even increase the risk of errors due to the numerous uncertain input factors that need to be estimated (Damodaran, 2002). Based on Puma's data availability, I aimed to incorporate the unique characteristics of multinational companies, such as their presence in different segments with varying growth and gross margin rates, while ensuring the complexity remained manageable and estimation challenges were addressed. Consequently, I opted for a disaggregated approach at the product segment level until the gross profit line item in the P&L. Beyond this point, I used an aggregated approach. This decision was based on Puma's disclosure of past sales growth rates, gross profit margins, the absence of high centralized costs and qualitative information on strategic initiatives for the future at segment level, which can be used

to make justified future predictions without excessive subjectivity. However, I always verified that the aggregated figure for the entire company was sensible.

The presence in multiple markets and business segments not only increases the complexities involved in forecasting future cash flows but also exposes MNEs as opposed to single business domestic companies to a broader array of risks. These additional risks must be considered in the cost of capital, particularly in the cost of equity, by accounting for multiple weighted industry betas and country risk premiums. Unlike Damodaran's (2009a) aggregated approach, I considered changes in risk parameters due to expected shifts in Puma's regional or business segment presence, even though I used a single WACC rather than multiple WACCs. This was achieved by adjusting the weights based on the average anticipated shift in revenue contribution over the planning period by regions and product segments. For instance, an expected expansion in the regional presence in emerging markets like Latin America, was taken into account by increasing the weight of the regional risk premium in the overall cost of equity. Similarly, the expected higher contribution of the footwear segment was considered by incorporating the higher levered industry beta with a higher weighting into the aggregated beta. Using one instead of multiple WACCs also has the advantage of lower complexity and facilitates sensitivity analysis, which is crucial for testing a DCF valuation model.

For determining the after-tax cost of debt and the NOPAT, an additional challenge arose regarding the income tax rate, as Puma generates worldwide income subject to varying country tax rates. Given the lack of net income or even revenue disclosure at country level, potential changes in future income tax rates across multiple countries, and the possibility of profit shifting to favorable tax jurisdictions, I assumed the average effective tax rate of 24.66% from the past five years from 2019 to 2023 for Puma to be best and least subjective proxy for the future income tax rate. This approach contrasts with Damodaran's (2009b) method, which uses the highest marginal tax rate across the countries in which the company operates, arguing that interest expenses on debt will be routed to that country in order to maximize tax benefits.

In conclusion, to guarantee an accurate DCF valuation that reflects the actual risk exposure and growth characteristics of an MNE, its segments, and operating regions, it is crucial to include the unique features of such companies in the DCF valuation model. However, this should be done based on the data availability and materiality in both the FCFF forecast and the cost of capital estimation without overcomplicating the valuation model and creating a false precision.

5.2. Practical Implications

As a practical-oriented master's thesis applying the FCFF approach to the real-world company Puma SE, this work provides several implications for practitioners related to the DCF valuation of MNEs and the current market and analyst valuations of Puma SE compared to the results derived from my comprehensive DCF valuation.

First, regarding the valuation of MNEs, this thesis aims to raise awareness among practitioners about the unique challenges when valuing such entities and encourages them to incorporate the specifications into their valuation models considering the data availability. The suggestions provided in this thesis, including the selection of the appropriate currency, the length of the forecasting period, the type of forecasting approach for the FCFF (aggregated vs. disaggregated),

the determination of the income tax rate, and the estimation of the cost of equity, among other things, offer practical guidance for addressing these challenges.

Second, compared to the actual share price of €50.52 at the end of 2023, the estimated share price for Puma of €53.26 derived from my DCF valuation for the same day, indicates a slight undervaluation by the market of €2.74. This might be the consequence of the market overemphasizing short-term issues such as recent leadership changes and the impact of the Argentine peso devaluation rather than taking into account Puma's long-term growth and earnings potential. Additionally, the lower earnings multiples of Puma, such as the enterprise value to EBITDA or P/E ratio, compared with those of its peers and industry averages, further support the argument that Puma may be undervalued by the market.

Third, when comparing the obtained target prices as of December 31, 2025, for Puma from different analysts with each other and to my estimated share price of €60.7 for the same day, the following conclusions can be drawn. While analysts from RBC Capital Markets and JP Morgan use a WACC of 10% and terminal growth rates of 2.5% and 2%, respectively, resulting in target prices of €47, Hauck Aufhäuser Investment Banking uses a WACC of 8% and a growth rate of 2.5%, leading to a significantly higher target price of €70. My own sensitivity analysis for the target price at the end of 2025 aligns with these findings, where adjusting the WACC and growth rates to match those used by analysts led to comparable outcomes. This perfectly illustrates that even little variations in these important parameters can have a big impact on the entire DCF valuation outcome and affect recommendations on whether to purchase, hold, or sell shares. Therefore, it is crucial to critically evaluate every valuation model based on the chosen input parameters.

5.3. Limitations and recommendations for future research

As with any valuation model, also this DCF valuation model has its limitations. DCF analysis is fundamentally forward-looking, relying heavily on assumptions about the future, comprising various elements such as the discount rate and the overall estimated FCFF parameters over the forecasting period and beyond, into the terminal phase. Since the future is inherently uncertain, the assumptions about these parameters can vary significantly among analysts and even minor adjustments in critical parameters like the WACC or the terminal growth rate, as illustrated in the sensitivity analysis, can disproportionately affect the calculated present value. Therefore, the obtained results and recommendations should be critically scrutinized by potential investors, especially due to multi-causal relationships where numerous factors simultaneously influence the future development of each FCFF parameter. This uncertainty is further complicated by the limited data availability and discrepancies observed not only for future projections but also in historical data, for instance, regarding the market size of the sporting goods industry, and the size and growth rates of specific segments within the industry like athletic footwear across different sources. To address this, forecasting multiple scenarios (e.g. pessimistic, base, and optimistic scenario) for instance for the revenue growth could be considered in future valuation models. However, this approach increases the complexity and number of assumptions required for every scenario. Additionally, to derive a single fair value, these scenarios would need to be weighted, introducing subjectivity into the weighting process.

The estimation of the cost of equity in the multinational context introduces its own set of limitations. To capture Puma's diverse risk exposure across different product segments, multiple industry betas determined from historical data by valuation expert Aswath Damodaran have been employed. However, these betas are based on a selection of companies that may not always align closely with Puma's actual market peers but rather include a broad range of companies from the general apparel and footwear markets and not strictly those in athletic apparel and footwear. Therefore, future Puma DCF valuation models may take into account modifying the betas to better reflect the anticipated faster growth of the sporting goods industry compared to the wider market. Moreover, relying on historical data to forecast future industry betas, country risk premiums and other parameters poses risks, as past performance may not reliably predict future conditions, especially given the variability influenced by the specific periods over which these parameters are calculated or the type of average applied. Overall, the estimation of the cost of equity based on the CAPM, despite its widespread use, can be questioned as it has some drawbacks such as the assumption about a linear relationship between risk and return. For future DCF valuations, alternative models such as the Fama-French three-factor model, which accounts for size and value factors along with market risk, or the Arbitrage Pricing Theory (APT), which can incorporate multiple risk factors and is less restrictive than CAPM, could be explored (Fernandez, 2002; Koller et al., 2020).

Furthermore, it's important to understand that a DCF valuation is not static but requires frequent updates as new information becomes available. In the case of Puma, such an update might be necessary, if the publication of the Q2 2024 results on August 7, 2024, reveals that the actual numbers deviate from the estimated ones (PUMA SE, n.d.). Similarly, changes in accounting standards, such as those made with IFRS 16 on leases, might have an impact on the valuation by changing, for instance, the debt perception.

Additionally, to deepen the understanding of Puma's obtained valuation, other valuation methods could be applied to Puma such as sum-of-parts multiple valuation or the residual income method, and a DCF analysis of its two main competitors, Adidas and Nike, could be performed.

Regarding the DCF method, it is important to be aware that even though it was applicable to Puma, it may not be suitable for all firms, such as startups or companies that do not generate consistent positive cash flows. These types of companies might require different valuation techniques such as real options or revenue-based valuation models (Koller et al., 2020; Damodaran, 2009c). In the end, there isn't a single "correct" valuation approach, but instead the most suitable method always depends on the specific circumstances and requirements of the stakeholders involved (Moxter, 1983).

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ANNEXES

Annex A: Revenue growth in % by segment from 2019 to 2023

Sales Growth in %	31.12.2019	31.12.2020	31.12.2021	31.12.2022	31.12.2023	Arithmetic average of the last two years
Footwear	16.84%	-7.24%	33.62%	36.49%	6.15%	21.32%
Apparel	22.59%	-4.57%	27.52%	15.06%	-4.60%	5.23%
Accessories	13.53%	1.32%	25.97%	11.25%	0.34%	5.80%
Total	18.37%	-4.87%	30.01%	24.39%	1.61%	13.00%

Source: Own elaboration using Puma's financial data

Annex B: Revenue allocation in % by segment from 2019 to 2023

Sales allocation %	31.12.2019	31.12.2020	31.12.2021	31.12.2022	31.12.2023	Arithmetic average of the last two years
Footwear	46.39%	45.23%	46.49%	51.01%	53.28%	52.15%
Apparel	37.60%	37.71%	36.99%	34.21%	32.12%	33.17%
Accessories	16.01%	17.05%	16.52%	14.78%	14.59%	14.69%
Total	100.00%	100.00%	100.00%	100.00%	100.00%	

Source: Own elaboration using Puma's financial data

Annex C: (Expected) revenue growth in % by region from 2023 to 2037

Revenue growth in % by region	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
EMEA including South East Asia & India	30.30%	11.87%	7.19%	6.93%	4.57%	4.96%	4.53%	4.81%	4.10%	4.15%	3.68%	3.26%	2.74%	2.41%	2.11%	1.85%
Western Europe	26.18%	4.86%	7.69%	5.58%	0.47%	2.47%	2.13%	3.67%	2.77%	3.35%	2.51%	2.02%	2.09%	1.75%	1.44%	1.15%
EEMEA including India & Southeast Asia	36.73%	21.97%	6.56%	8.62%	9.56%	7.75%	7.08%	5.95%	5.42%	4.93%	4.80%	4.41%	3.32%	3.00%	2.72%	2.46%
America	39.60%	-8.10%	1.34%	6.94%	9.61%	8.27%	7.61%	6.00%	5.47%	4.68%	4.24%	3.85%	3.49%	3.17%	2.88%	2.62%
United States	0.00%	-17.16%	-0.20%	7.02%	10.63%	8.81%	8.14%	6.48%	5.94%	4.93%	4.49%	4.09%	3.74%	3.42%	3.13%	2.87%
Rest of North America	0.00%	-17.75%	-0.20%	1.16%	6.33%	5.61%	4.96%	4.37%	3.84%	3.36%	2.93%	2.54%	2.19%	1.87%	1.59%	1.33%
Latin America	74.08%	12.89%	3.96%	7.55%	8.48%	7.75%	7.08%	5.44%	4.90%	4.42%	3.98%	3.59%	3.23%	2.91%	2.62%	2.36%
Asia/Pacific (excluding South East Asia & India)	-14.65%	2.17%	1.84%	5.98%	13.72%	9.89%	8.16%	7.56%	7.03%	5.75%	5.31%	4.92%	4.01%	3.69%	3.40%	3.14%
Asia/Pacific (excluding Greater China, South East Asia & India)	10.33%	-1.07%	0.84%	7.55%	9.56%	8.81%	7.08%	6.48%	5.94%	4.93%	4.49%	4.09%	3.74%	3.42%	3.13%	2.87%
Greater China	-32.03%	5.83%	2.90%	4.36%	18.15%	10.95%	9.20%	8.59%	8.04%	6.49%	6.05%	5.65%	4.25%	3.93%	3.64%	3.38%
Stichd subsidiary	15.66%	4.26%	2.64%	1.16%	-0.11%	0.28%	-0.34%	-0.90%	-0.35%	-0.81%	-1.23%	-1.60%	2.19%	1.87%	1.59%	1.33%
Total	24.39%	1.61%	3.96%	6.49%	7.41%	6.68%	6.02%	5.43%	4.89%	4.41%	3.97%	3.58%	3.22%	2.90%	2.61%	2.35%

Source: Own elaboration using Puma's financial data

Annex D: (Expected) revenue allocation in % by region from 2023 to 2037

Revenue allocation in % by region	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
EMEA including South East Asia & India	42.34%	43.66%	43.84%	42.68%	41.99%	41.40%	41.16%	40.85%	40.75%	40.64%	40.51%	40.32%	40.13%	39.93%	39.73%
Western Europe	23.44%	24.28%	24.07%	22.52%	21.63%	20.83%	20.49%	20.07%	19.87%	19.59%	19.30%	19.09%	18.87%	18.65%	18.44%
EEMEA including India & Southeast Asia	18.91%	19.38%	19.77%	20.16%	20.36%	20.57%	20.67%	20.77%	20.88%	21.04%	21.21%	21.23%	21.25%	21.28%	21.30%
America	38.78%	37.81%	37.97%	38.75%	39.32%	39.91%	40.13%	40.35%	40.45%	40.56%	40.66%	40.77%	40.87%	40.98%	41.09%
United States	22.48%	21.58%	21.69%	22.34%	22.79%	23.24%	23.47%	23.71%	23.83%	23.95%	24.07%	24.19%	24.31%	24.43%	24.55%
Rest of North America	1.89%	1.81%	1.72%	1.70%	1.69%	1.67%	1.65%	1.64%	1.62%	1.60%	1.59%	1.57%	1.56%	1.54%	1.52%
Latin America	14.41%	14.41%	14.56%	14.70%	14.85%	15.00%	15.00%	15.00%	15.00%	15.01%	15.01%	15.01%	15.01%	15.01%	15.01%
Asia/Pacific (excluding South East Asia & India)	13.18%	12.91%	12.85%	13.61%	14.02%	14.30%	14.59%	14.89%	15.08%	15.27%	15.47%	15.59%	15.71%	15.83%	15.95%
Asia/Pacific (excluding Greater China, South East Asia & India)	6.77%	6.57%	6.63%	6.76%	6.90%	6.97%	7.04%	7.11%	7.14%	7.18%	7.22%	7.25%	7.29%	7.32%	7.36%
Greater China	6.41%	6.35%	6.22%	6.84%	7.12%	7.33%	7.55%	7.78%	7.93%	8.09%	8.25%	8.34%	8.42%	8.50%	8.59%
Stichd subsidiary	5.69%	5.62%	5.34%	4.97%	4.67%	4.39%	4.13%	3.92%	3.72%	3.54%	3.36%	3.33%	3.29%	3.26%	3.23%
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

Source: Own elaboration using Puma's financial data

Annex E: Gross profit in € and gross profit margin in % development from 2019 to 2023:

Year	31.12.2019	31.12.2020	31.12.2021	31.12.2022	31.12.2023	Arithmetic average of the last two years
Gross Profit in €	2,686,400,000	2,458,000,000	3,257,800,000	3,902,800,000	3,986,600,000	3,944,700,000
Gross profit margin in %	48.82%	46.96%	47.87%	46.10%	46.35%	46.23%

Source: Own elaboration using Puma's financial data

Annex F: Gross profit margin in % by segment from 2019 to 2023

Gross profit margin by segment in %	31.12.2019	31.12.2020	31.12.2021	31.12.2022	31.12.2023	Arithmetic average of the last two years
Footwear	46.40%	45.70%	47.30%	44.90%	45.40%	45.15%
Apparel	51.10%	48.50%	48.90%	47.30%	47.80%	47.55%
Accessories	50.50%	47.00%	47.10%	47.40%	46.60%	47.00%
Total	48.82%	46.96%	47.87%	46.10%	46.35%	46.23%

Source: Own elaboration using Puma's financial data

Annex G: (Expected) gross profit margin development in % by segment from 2022 to 2037

Gross profit margin by segment	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
Footwear	44.90%	45.40%	46.13%	46.80%	47.28%	47.52%	47.59%	47.59%	47.59%	47.58%	47.57%	47.53%	47.49%	47.45%	47.41%	47.36%
Apparel	47.30%	47.80%	48.66%	49.45%	49.97%	50.23%	50.31%	50.31%	50.30%	50.30%	50.28%	50.24%	50.20%	50.15%	50.11%	50.07%
Accessories	47.40%	46.60%	46.88%	47.44%	48.06%	48.37%	48.47%	48.47%	48.47%	48.46%	48.44%	48.40%	48.36%	48.32%	48.28%	48.24%
Total	46.09%	46.35%	47.03%	47.71%	48.22%	48.46%	48.53%	48.53%	48.52%	48.50%	48.48%	48.44%	48.39%	48.35%	48.30%	48.26%

Source: Own elaboration using Puma's financial data

Annex H: (Expected) revenue development in % by distribution channel from 2021 to 2037

Revenue in % by distribution channel	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
DTC channel	25.3%	23.1%	24.8%	24.9%	25.2%	25.5%	25.7%	26.0%	26.0%	26.0%	26.1%	26.1%	26.1%	26.1%	26.2%	26.2%	26.2%
Wholesale channel	74.7%	76.9%	75.2%	75.1%	74.8%	74.5%	74.3%	74.0%	74.0%	74.0%	73.9%	73.9%	73.9%	73.9%	73.8%	73.8%	73.8%
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

Source: Own elaboration using Puma's financial data

Annex I: Royalty and commission income in € from 2019 to 2023

Year	31.12.2019	31.12.2020	31.12.2021	31.12.2022	31.12.2023	Arithmetic average of the last two years
Royalty and commission income in €	25,100,000	16,100,000	23,900,000	33,800,000	38,500,000	36,150,000
Y-o-Y growth in %		-35.86%	48.45%	41.42%	13.91%	27.66%
in % of sales	0.46%	0.31%	0.35%	0.40%	0.45%	0.42%

Source: Own elaboration using Puma's financial data

Annex J: (Expected) Royalty and commission income in million € from 2022 to 2037

Year	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
Royalty and commission income in million €	33.80	38.50	37.86	40.32	43.31	46.20	48.98	51.64	54.17	56.55	58.80	60.90	62.86	64.69	66.38	67.94
in % of sales	0.40%	0.45%	0.42%	0.42%	0.42%	0.42%	0.42%	0.42%	0.42%	0.42%	0.42%	0.42%	0.42%	0.42%	0.42%	0.42%

Source: Own elaboration using Puma's financial data

Annex K: OPEX in % of sales from 2019 to 2023

OPEX in % of sales	31.12.2019	31.12.2020	31.12.2021	31.12.2022	31.12.2023	Arithmetic average of the last two years
Sales and distribution expenses	33.10%	34.27%	32.44%	31.63%	32.54%	32.08%
Product management/merchandising	0.96%	0.88%	0.78%	0.84%	0.96%	0.90%
Research and development	1.12%	1.08%	0.91%	0.97%	1.03%	1.00%
Administrative and general expenses	6.18%	7.04%	5.95%	5.50%	5.24%	5.37%
Total OPEX in % of sales	41.36%	43.28%	40.07%	38.94%	39.78%	39.36%

Source: Own elaboration using Puma's financial data

Annex L: (Expected) OPEX in % of sales development from 2022 to 2037

OPEX in % of sales	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
Sales and distribution expenses	31.6%	32.5%	32.9%	32.9%	32.9%	32.9%	32.9%	32.8%	32.8%	32.8%	32.7%	32.7%	32.6%	32.6%	32.5%	32.5%
Product management/merchandising	0.8%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%
Research and development	1.0%	1.0%	1.1%	1.1%	1.1%	1.1%	1.1%	1.1%	1.1%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%
Administrative and general expenses	5.5%	5.2%	5.2%	5.2%	5.2%	5.2%	5.2%	5.2%	5.1%	5.1%	5.1%	5.1%	5.1%	5.1%	5.0%	5.0%
Total OPEX in % of sales	38.9%	39.8%	40.2%	40.2%	40.1%	40.1%	40.1%	40.0%	39.9%	39.9%	39.8%	39.7%	39.7%	39.6%	39.5%	39.4%

Source: Own elaboration using Puma's financial data

Annex M: (Expected) other operating income in € from from 2019 to 2037

Year	2019	2020	2021	2022	2023	Average Other operating income over the past five years	Estimated value over the planning period (2024 to 2037)
Other operating income in €	4,200,000	400,000	2,600,000	100,000	17,800,000	5,020,000	6,140,000
<p>Explanation: The other operating income includes revenues from the sale of fixed assets, selling profits from finance leases, and rental income (Puma SE, 2023a). Historically, before 2023, this income primarily came from the sale of fixed assets. However, in 2023, Puma also recorded income from renting (€1.4 million) and selling profits from finance leases (€8.0 million) for the first time (Puma SE, 2023a). In general, it can be stated, that the other operating income has shown significant volatility over the past five years, ranging from €100,000 in 2022 to €17.8 million in 2023. Given this variability, forecasting income from selling profits from finance leases or the disposal of fixed assets is challenging. For the rental income of €1.4 million reported in 2023, I assumed it to be stable over the planning period. To estimate the remaining other operating income over the forecast period, the average of the past five years' other operating income, excluding the 2023 rental income, is used, to get a well-rounded picture and amounts €4.74 million. Including the consistent rental income, the total projected other operating income is assumed to be €6.14 million annually over the forecasting period. The assumption is based on simplicity, the low materiality of the figures, and the lack of specific information.</p>							

Source: Own elaboration using Puma's financial data

Annex N: Effective income tax rate in % for Puma from 2019 to 2023

Year	2019	2020	2021	2022	2023	Average over the past five years
Effective income tax rate Puma in %	26%	24.20%	25.40%	23.10%	24.60%	24.66%

Source: Own elaboration using Puma's financial data

Annex O: Changes in non-cash effected expenses/ revenues in € from 2019 to 2023

Year	2019	2020	2021	2022	2023
Gains/losses from the sale of fixed assets in €	2,100,000	2,400,000	5,100,000	1,000,000	3,900,000
Changes to pension provision in €	-1,200,000	-1,000,000	-3,700,000	500,000	-1,500,000
Other non-cash effected expenses/revenues in €	5,000,000	- 4,000,000	-4,500,000	28,600,000	22,500,000
Total changes in non-cash effected expenses/revenues in €	5,900,000	- 2,600,000	-3,100,000	30,100,000	17,100,000

Source: Own elaboration using Puma's cash flow statements

Annex P: (Expected) Capex development in million € and % of sales from 2022 to 2037

Year	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
CAPEX in million €	263.90	299.60	300.00	317.87	339.71	360.59	380.39	397.03	412.28	426.15	438.63	449.78	459.63	468.23	475.67	481.99
in % of sales	3.12%	3.48%	3.35%	3.34%	3.32%	3.30%	3.29%	3.26%	3.22%	3.19%	3.16%	3.13%	3.10%	3.06%	3.03%	3.00%

Source: Own elaboration using Puma's financial data

Annex Q: (Expected) depreciation & amortization (D&A) for fixed assets (excluding impairment and depreciation of right-of-use asset) in million € from 2022 to 2037

Year	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
D&A on existing FA in million €			140.63	136.76	126.04	115.31	111.32	72.46	35.01	33.43	33.31	5.46	5.46	5.46	5.46	5.46
D&A on newly acquired FA in million €			26.00	53.55	83.00	114.25	147.22	181.63	217.36	254.30	292.32	331.30	345.99	359.92	372.66	384.21
Total	129.9	142.5	166.63	190.31	209.03	229.56	258.54	254.09	252.38	287.73	325.63	336.76	351.44	365.38	378.12	389.66

Source: Own elaboration using Puma's financial data

Annex R: (Expected) other non-cash net working capital development in million € from 2022 to 2037

Other NCNWC forecast	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
L Prepaid expense relating to the subsequent period	86.2	98.3	98.6	105.0	112.7	120.1	127.2	133.9	140.2	146.1	151.7	156.8	161.6	166.0	170.0	173.7
L Other receivables	149.8	172.1	179.1	187.1	196.0	206.0	217.2	229.7	243.7	259.2	276.4	295.5	316.7	340.2	366.2	394.9
Total other current assets	236.0	270.4	277.8	292.0	308.6	326.1	344.4	363.6	383.9	405.3	428.1	452.3	478.3	506.2	536.2	568.6
Total income tax receivables	54	90.1	90.1	90.1	90.1	90.1	90.1	90.1	90.1	90.1	90.1	90.1	90.1	90.1	90.1	90.1
L Provisions for Warranties	2.7	2.1	2.4	2.5	2.7	2.9	3.0	3.2	3.4	3.5	3.7	3.8	3.9	4.0	4.1	4.2
L Provisions for Purchasing risks	7.1	7.4	7.8	8.3	8.9	9.5	10.1	10.8	11.4	11.9	12.5	13.0	13.5	13.9	14.3	14.7
L Provisions for Litigation risks	18.2	6.4	12.3	12.3	12.3	12.3	12.3	12.3	12.3	12.3	12.3	12.3	12.3	12.3	12.3	12.3
L Provisions for Restoration obligations	2.9	3.0	3.1	3.2	3.3	3.4	3.6	3.7	3.8	3.9	4.1	4.2	4.4	4.5	4.7	4.8
L Provisions for Other	19.3	8.7	14.5	14.8	15.2	15.7	16.1	16.5	16.8	17.0	17.1	17.2	17.3	17.3	17.2	17.1
Total other current provisions	50.2	27.6	40.0	41.0	42.4	43.8	45.2	46.4	47.6	48.7	49.6	50.5	51.3	52.0	52.6	53.2
L Liabilities from other taxes	82.6	110.0	114.4	121.8	130.8	139.5	147.9	156.0	163.6	170.8	177.6	183.9	189.9	195.4	200.5	205.2
L Liabilities relating to social security	10.0	10.6	11.0	11.7	12.5	13.3	14.1	14.9	15.6	16.3	16.9	17.5	18.0	18.5	19.0	19.4
L Payables to employees	137.2	123.6	125.2	130.6	137.3	143.4	148.8	155.2	161.0	166.2	170.9	175.1	178.8	181.9	184.6	186.9
L Liabilities from refund obligations	373.9	236.9	214.2	213.3	221.6	232.6	244.6	256.8	268.8	280.4	291.4	301.7	311.4	320.4	328.8	336.5
L Remaining other current liabilities	15.2	12.3	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8
Total other current liabilities	618.9	493.4	478.5	491.0	516.0	542.6	569.2	596.6	622.7	647.4	670.5	692.0	711.8	730.0	746.6	761.8
Total income tax liabilities	86.8	79.3	79.3	79.3	79.3	79.3	79.3	79.3	79.3	79.3	79.3	79.3	79.3	79.3	79.3	79.3

Source: Own elaboration using Puma's financial data

Annex S: Development of days of inventory, days of collection & days of payment from 2019 to 2023

Past ratios for forecasting inventory, trade receivables & trade payables	31.12.2019	31.12.2020	31.12.2021	31.12.2022	31.12.2023
Days of inventory	143.89	149.66	153.49	179.57	142.71
Days of collection	40.58	43.30	45.48	45.92	47.46
Days of payment	109.37	123.77	121.04	138.80	118.62

Source: Own elaboration using Puma's financial data

Annex T: (Expected) total non-cash net working capital development in million € from 2022 to 2037

NCNWC	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
Inventory	2245.1	1804.4	1,790.5	1,882.1	2,035.4	2,157.0	2,279.8	2,399.8	2,513.7	2,621.1	2,722.2	2,818.0	2,907.4	2,990.3	3,067.1	3,137.9
Trade receivables	1064.9	1118.4	1,174.3	1,238.0	1,316.4	1,390.3	1,459.3	1,515.4	1,565.7	1,610.1	1,648.9	1,682.3	1,710.5	1,733.7	1,752.3	1,766.6
Trade payables	1734.9	1499.8	1,533.1	1,605.1	1,700.6	1,798.3	1,896.4	1,991.6	2,081.1	2,164.7	2,242.4	2,315.4	2,382.6	2,444.0	2,500.0	2,550.8
Other components	-465.9	-239.8	-230.0	-229.2	-239.0	-249.5	-259.1	-268.6	-275.7	-280.0	-281.3	-279.3	-274.0	-265.0	-252.3	-235.5
Total NCNWC	1,109	1,183	1,202	1,286	1,412	1,499	1,584	1,655	1,723	1,787	1,847	1,906	1,961	2,015	2,067	2,118
In % of sales	13.10%	13.76%	13.44%	13.50%	13.81%	13.74%	13.69%	13.57%	13.47%	13.38%	13.30%	13.25%	13.21%	13.19%	13.19%	13.20%

Source: Own elaboration using Puma's financial data

Annex U: Estimation of (expected) growth rate (g) in % as product of reinvestment rate and return on invested capital (ROIC) from 2023 to 2037

Year	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
NOPAT in million €	468	494	576	660	726	779	826	872	916	958	994	1,029	1,061	1,092	1,121
Reinvestment needs in million €	231	152	212	257	218	206	214	228	202	174	171	164	157	150	143
Reinvestment rate in %	49.4%	30.8%	36.7%	39.0%	30.0%	26.4%	26.0%	26.1%	22.1%	18.1%	17.2%	15.9%	14.7%	13.7%	12.8%
Invested Capital in million €	3,688	3,986	4,197	4,455	4,673	4,879	5,093	5,321	5,523	5,697	5,868	6,032	6,189	6,338	6,482
Return on invested capital in %	13.2%	13.4%	14.5%	15.7%	16.3%	16.7%	16.9%	17.1%	17.2%	17.3%	17.5%	17.5%	17.6%	17.6%	17.7%
Growth rate in %	6.50%	4.12%	5.31%	6.13%	4.90%	4.41%	4.40%	4.47%	3.80%	3.15%	3.00%	2.79%	2.59%	2.42%	2.26%

Source: Own elaboration using Puma's financial data

Annex V: Calculation of aggregated levered beta for Puma

Product segments	Unlevered Industry betas for Europe from Damodaran	Effective Tax rate	Debt to equity ratio	Levered beta	Weights = (Expected) average relative revenue contribution from 2023 to 2037	Weighted levered betas
Footwear	1.08	24.66%	0.238	1.27	56.69%	0.72
Apparel	0.93	24.66%	0.238	1.10	30.15%	0.33
Accessories	1.00	24.66%	0.238	1.18	13.16%	0.16
Total					100.00%	1.21

Source: Own elaboration using Damodaran unlevered industry betas and Puma's financial data

Annex W: Example calculation of Regional Risk Premium (RRP) for Greater China of 1.02%

Determination of RRP for “Greater China”				
Countries in Greater China	GDP in 2022 in billion US Dollar	Weight = relative GDP in 2022	Country Risk Premium (CRP) from Damodaran	Weighted CRP
China	17,963,171.48	94.0%	1.03%	0.97%
Hong Kong	359,838.58	1.9%	0.88%	0.02%
Macao	24,042.29	0.1%	0.88%	0.00%
Taiwan	761,690.00	4.0%	0.88%	0.03%
Total	19,108,742.35	100%		1.02%

Source: Own elaboration using the CRPs from Damodaran

Annex X: Determination of aggregated RRP for Puma based on Puma’s (expected) relative regional revenue contribution from 2023 to 2037

Puma's main regions	Regional risk premiums (RRP)	Weights = (Expected) Average relative regional revenue contribution from 2023 to 2037	Weighted RRP
Western Europe	1.29%	20.74%	0.27%
Eastern Europe, Middle East, Africa, India and Southeast Asia (EEMEA) -> see Regional Risk Premium Calc	4.23%	20.58%	0.87%
Asia/Pacific (excluding Greater China & South East Asia, India)	2.17%	7.03%	0.15%
Greater China	1.02%	7.58%	0.08%
North America	0.00%	25.03%	0.00%
Latin America = Central, South America and Caribbean	6.92%	14.87%	1.03%
stichd + Central Areas = Global	1.81%	4.16%	0.08%
Total		100.00%	2.47%

Source: Own elaboration using the CRPs from Damodaran

Annex Y: (Expected) balance sheet development in million € from 2022 to 2037

Year	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
Cash and cash equivalents	463	553	596	657	661	701	744	886	1,033	1,221	1,453	1,700	1,967	2,254	2,558	2,878
Inventories	2,245	1,804	1,790	1,882	2,035	2,157	2,280	2,400	2,514	2,621	2,722	2,818	2,907	2,990	3,067	3,138
Trade receivables	1,065	1,118	1,174	1,238	1,316	1,390	1,459	1,515	1,566	1,610	1,649	1,682	1,710	1,734	1,752	1,767
Income tax receivables	54	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90
Other current financial assets	138	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95
Other current assets	236	270	278	292	309	326	344	364	384	405	428	452	478	506	536	569
Total current assets	4,201	3,931	4,024	4,254	4,506	4,760	5,012	5,350	5,681	6,043	6,437	6,838	7,248	7,669	8,098	8,537
Net PP&E	592	685	766	844	927	1,015	1,098	1,210	1,344	1,466	1,572	1,663	1,750	1,835	1,916	1,994
Net Goodwill	243	239	239	239	239	239	239	239	239	239	239	239	239	239	239	239
Net other intangible assets	264	292	345	395	442	485	524	555	580	597	604	626	647	665	682	696
Net Right-of-use assets	1,111	1,088	1,088	1,088	1,088	1,088	1,088	1,088	1,088	1,088	1,088	1,088	1,088	1,088	1,088	1,088
Deferred tax assets	295	296	296	296	296	296	296	296	296	296	296	296	296	296	296	296
Other non-current financial assets	58	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84
Other non-current assets	9	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26
Total non-current assets	2,572	2,709	2,843	2,970	3,101	3,232	3,354	3,497	3,657	3,795	3,908	4,021	4,129	4,232	4,330	4,422
Total assets	6,773	6,641	6,866	7,224	7,607	7,992	8,366	8,847	9,338	9,838	10,345	10,859	11,378	11,901	12,428	12,959
Current borrowings	76	146	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Trade payables	1,735	1,500	1,533	1,605	1,701	1,798	1,896	1,992	2,081	2,165	2,242	2,315	2,383	2,444	2,500	2,551
Income tax liabilities	87	79	79	79	79	79	79	79	79	79	79	79	79	79	79	79
Current lease liabilities	200	212	212	212	212	212	212	212	212	212	212	212	212	212	212	212
Other current provisions	50	28	40	41	42	44	45	46	48	49	50	51	51	52	53	53
Other current financial liabilities	76	79	79	79	79	79	79	79	79	79	79	79	79	79	79	79
Other current liabilities	619	493	479	491	516	543	569	597	623	647	671	692	712	730	747	762
Current liabilities	2,843	2,537	2,422	2,507	2,629	2,755	2,881	3,005	3,122	3,231	3,333	3,428	3,516	3,596	3,670	3,736
Non-current borrowings	252	426	567	618	620	593	534	563	589	612	634	653	670	685	699	710
Non-current lease liabilities	1,030	1,020	1,020	1,020	1,020	1,020	1,020	1,020	1,020	1,020	1,020	1,020	1,020	1,020	1,020	1,020
Deferred tax liabilities	42	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
Pension provisions	22	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23
Other non-current provisions	30	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27
Other non-current financial liabilities	14	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11
Other non-current liabilities	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Total non-current liabilities	1,391	1,521	1,662	1,713	1,715	1,688	1,629	1,657	1,684	1,707	1,729	1,748	1,765	1,780	1,794	1,805
Total liabilities	4,234	4,058	4,084	4,220	4,345	4,443	4,510	4,662	4,805	4,938	5,062	5,176	5,281	5,377	5,463	5,541
Equity attributable to the shareholders of PUMA SE	2,472	2,553	2,730	2,948	3,201	3,482	3,783	4,106	4,447	4,807	5,184	5,575	5,982	6,401	6,834	7,278
Non-controlling interests	67	29	53	57	62	67	73	79	86	92	100	107	115	123	131	140
Total equity	2,539	2,582	2,782	3,004	3,263	3,548	3,856	4,185	4,532	4,899	5,283	5,683	6,097	6,524	6,965	7,418
Total equity and liabilities	6,773	6,640	6,866	7,224	7,607	7,992	8,366	8,847	9,338	9,838	10,345	10,859	11,378	11,901	12,428	12,959

Source: Own elaboration using Puma's financial data

Annex Z: Puma EV/EBITDA and P/E multiple based on EV and price per share derived from DCF analysis as of 31.12.2023

Puma	31.12.2023
EBITDA in million €	966.8
Estimated enterprise value from DCF - cash in million €	8,708
EV to EBITDA multiple	9.01
Estimate share price in €	53.26
Earnings per share and diluted earnings per share in €	2.03
Price to earnings multiple	26.24

Source: Own elaboration using Puma's financial data

Annex Za: Nike EV/EBITDA and P/E multiple as of 31.05.2023

Nike	31.05.2023
EBITDA in million USD	6774
Market value of equity in million USD	161,260
Total debt (borrowings + lease liabilities) in million USD	12,138
Cash in million USD	7,441
Total enterprise value in million USD	165,957
EV/EBITDA multiple	24.50
Number of outstanding shares	1569.8
Share price in USD	102.73
Basic earnings per share from continuing and discontinued operations (in USD)	3.27
Price to earnings multiple	31.41

Source: Own elaboration using Nike's financial data