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FUNDAMENTAL PAIRS TRADE OF ADIDAS AND PUMA

MACROECONOMIC AND INDUSTRY ANALYSES

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Abstract: This thesis explores a fundamental pairs trade strategy of adidas and PUMA. Macroeconomic and industry analyses highlight regional economic trends, inflation, and demographic shifts impacting both companies. The expanding global sportswear market, driven by Emerging Markets, athleisure demand, and sustainability trends, faces external and sector-specific challenges, requiring strategic adaptation to maintain competitiveness. The valuation emphasizes PUMA's undervaluation and growth potential versus adidas' overvaluation and higher risk. The long PUMA, short adidas strategy proves robust, offering investors a promising opportunity for risk reduction and relative returns.

Keywords: Fundamental Pairs Trade, adidas, PUMA, Global Economy, Macroeconomic Indicators, Global Sporting Goods Industry, Market Drivers and Trends, Competition, Product Segmentation, Athleisure, Company Valuation, Discounted Cash Flow, Scenario Analysis, Risk Management, Investment Proposition

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Introduction

In this paper, a detailed analysis of a pairs trade strategy of adidas and PUMA has been conducted. The goal is to assess whether a long position in PUMA combined with a short position in adidas could yield profitable returns by exploiting PUMA's relative strengths and adidas' vulnerabilities. The motivation behind this study lies in the contrasting outlooks for the two companies. While adidas faces operational challenges, such as profitability volatility, inventory issues and weaker growth in key regions, PUMA has proven consistent market share gains, particularly in high-potential Emerging Markets. This divergence, coupled with sector-wide trends such as rising consumer demand for performance and lifestyle products, presents a compelling case for leveraging a fundamental pairs trade to generate alpha. Key valuation insights reveal potential mispricing in both companies' stocks. PUMA offers greater upside potential, while adidas faces downside risks. The findings recommend a zero-cost portfolio with a long position in PUMA and a short position in adidas. PUMA stands out as a strong candidate for a long position due to its consistent growth in Emerging Markets. The company's focus on fast-growing footwear and innovative product offerings aligns well with evolving consumer preferences, enhancing its profitability. Additionally, PUMA has demonstrated superior operational efficiency, with effective working capital management and shorter inventory turnover cycles compared to adidas. Its agility in responding to market trends, such as the rising demand for athleisure and sustainable products, further underscores its competitive edge. Strong brand resonance, particularly among younger demographics, positions PUMA for sustained financial outperformance. Conversely, adidas presents several vulnerabilities that make it a suitable candidate for a short position. The company faces operational challenges, including persistent inventory issues and inefficient working capital management, which undermine profitability. Its heavy reliance on mature markets limits its growth potential compared to PUMA's success in high-growth regions. Financially, adidas faces margin

compression due to higher marketing expenses and operational inefficiencies. With its stock appearing overvalued relative to its growth prospects, and its slower adaptability to intensifying megatrends, adidas faces heightened risks, further supporting a short position. These findings collectively strengthen the recommendation for a pairs trade strategy that capitalizes on PUMA's growth momentum while hedging against adidas' challenges. To address risk, the analysis employs the Fama-French Five-Factor Model to assess exposure to market and economic variables, with results indicating limited factor-driven risks. Nevertheless, robust risk management practices are advised, including monitoring market volatility, valuation multiples, and company-specific developments.

The paper starts with the analysis of the external environment, including macroeconomic and industry dynamics. Next, a comparative assessment of adidas' and PUMA's strategies and financial performance is conducted. Forecasted financial figures and valuations follow, highlighting relative pricing inefficiencies. Scenario analyses test the strategy's resilience under various conditions, and the final section provides actionable recommendations, supported by risk management considerations. The findings offer institutional investors, financial analysts, and portfolio managers a data-driven framework for implementing a pairs trade in the competitive global sportswear market, capitalizing on PUMA's strengths and adidas' challenges to deliver potential outperformance.

Macroeconomic Environment

As key players in the global sporting goods market, adidas and PUMA must carefully consider macroeconomic factors that influence industry growth, consumer behavior, production, and supply chains. The following section therefore examines the most significant economic indicators and regional trends, divided into the key markets of adidas and PUMA, and challenges that could affect their businesses.

In 2023, the global economy grew by 3.2%, demonstrating resilience against several economic headwinds (International Monetary Fund 2024d). This growth rate is projected to stabilize at a moderate economic expansion of 3.1% per year starting in 2027 (Figure 1).

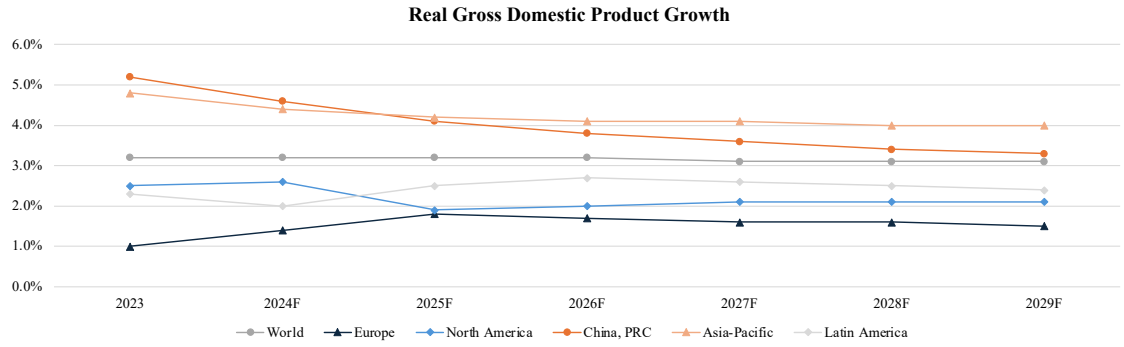

Figure 1: Development of Real GDP Growth from 2022 to 2029F (International Monetary Fund 2024d)

In advanced economies, particularly Europe and North America, economic activity continues at a slightly slower pace compared to the world, impacted by high borrowing costs and the resulting moderate domestic demand, withdrawal of fiscal support after the COVID-19 pandemic, and ongoing geopolitical tensions (International Monetary Fund 2024e). Slower gross domestic product (GDP) growth, especially in Europe, where adidas and PUMA are headquartered and have significant market presence, poses a risk to their revenue growth. In contrast, emerging economies, including China, Asia-Pacific, and Latin America, are expanding at a faster pace. However, forecasts suggest a sustained decline in growth. In China, private consumption is expected to decrease after the one-off effect of pandemic recovery, reducing business confidence (Ha 2024). Nevertheless, fiscal measures and exports are anticipated to provide support (OECD 2024). Meanwhile, Latin America faces financial constraints due to currency volatility against the American Dollar, heightening the risk of a potential debt crisis (Ha 2024). The growth rates of advanced and emerging economies influence their respective shares of global GDP. In 2023, advanced economies accounted for 54.3% of global GDP. However, this share is projected to decline, with Emerging Markets expected to contribute 48.1% by 2029. This economic shift may result in different growth

prospects for adidas and PUMA, shaped by their regional strategies and competitive strengths. If one company outperforms the other in the expanding Emerging Markets, this divergence could present an opportunity for a pairs trade.

Throughout 2023, global inflation remained high, affecting consumer confidence and household income, which led to a decrease in discretionary spending on athletic products. However, inflation is forecast to moderate in 2024 as global disinflation continues, falling from 6.8% to 5.9% (Figure 2). This moderation is supported by tight monetary policies and easing pressures on goods and energy prices (OECD 2024; International Monetary Fund 2024e). Advanced economies aim to return to a target inflation rate of 2%. In contrast, inflation in Emerging Markets excluding China remains persistently higher and thus continues to affect purchasing power and sales.

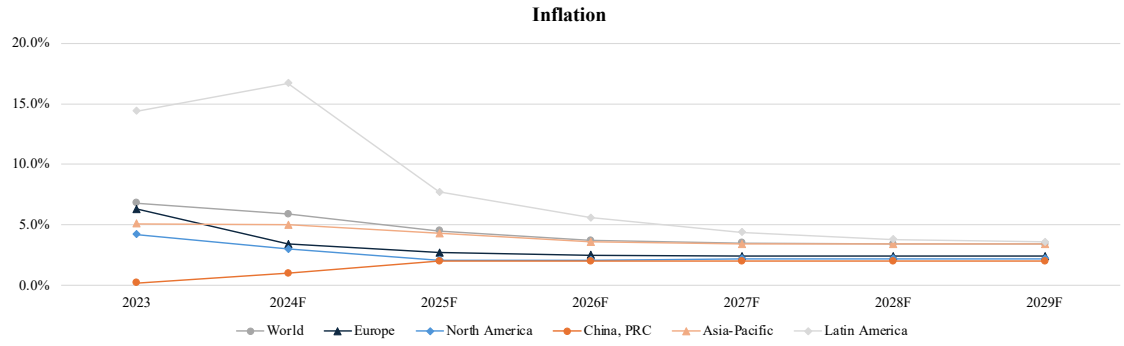

Figure 2: Development of Inflation from 2022 to 2029F (International Monetary Fund 2024b)

The world's major central banks have raised interest rates to counteract inflation (International Monetary Fund 2024e). This restrictive monetary policy is expected to remain in place for the foreseeable future, exerting pressure on the global economy, businesses, and consumers (World Bank Group 2024). For adidas and PUMA, this may lead to higher borrowing costs, increased inventory holding expenses, and potential delays in expansion plans or investments. However, as both companies operate in the sporting goods industry, which primarily offers affordable consumer goods, the impact of higher interest rates on consumer purchasing power is likely to be less pronounced compared to other industries (Becker et al. 2024).

Moreover, the distribution of the world's population and regional growth trends indicate that Asia-Pacific, including China, will account for more than half of the world's population by 2024, followed by advanced economies and Latin America, each with comparable shares (Figure 3).

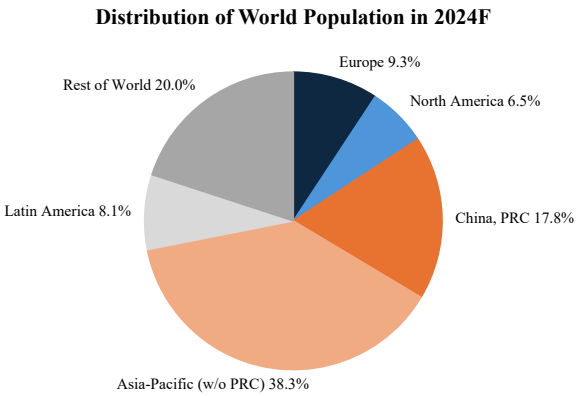

Figure 3: Distribution of World Population in 2024F (International Monetary Fund 2024c)

The population, particularly in Asia-Pacific without China, Latin America, and North America, is projected to experience consistent annual growth through 2029, providing long-term opportunities for adidas and PUMA to expand their market presence. However, the demographic shift toward an aging population, with the upper age group projected to increase by 8.1 percentage points from 2022 to 2050 and a slight decline of 3.5 percentage points in the middle age group, suggests a gradual change in consumer preferences (United Nations 2022). This shift could affect demand for sporting goods, requiring adjustments in marketing strategies and product offerings to cater to older consumers. The ability of each company to adapt to these demographic changes could influence their growth prospects and competitive dynamics.

In addition, further challenges are affecting the global economy. The escalation of geopolitical tensions, such as the Middle East crisis, could lead to disruptions in global trade, higher commodity prices, and strained supply chains (Ha 2024). International companies like adidas and PUMA, which rely heavily on global supply chains, face the risk of cost increases, production delays, and price inflation. Growing trade protectionism and supply chain disruptions may further impede global economic expansion, adversely impacting business

profitability (OECD 2024).

Climate-related disasters cause similar disruptions by damaging raw materials and interrupting production processes (Ha 2024). The uncertainty of such events poses risks that both businesses must address. However, the extent to which these challenges impact each company may vary depending on their supply chain structures, sourcing strategies, and geographic exposure.

Finally, elections in major economies, such as the United States (US), pose significant challenges for companies operating within these markets due to uncertainties surrounding trade tariffs and potential policy changes (World Bank Group 2024). Such outcomes could disrupt trade agreements, tax policies, regulations, and consumer demand, potentially leading to economic instability. This uncertainty may undermine business confidence and investment decisions, thereby affecting adidas' and PUMA's global operations and profitability.

In conclusion, the macroeconomic environment remains highly complex and presents ongoing challenges. Despite global risks, Emerging Markets, particularly Asia-Pacific and Latin America, offer significant opportunities for adidas and PUMA. Above-average economic growth, accelerating wealth creation, and favorable demographic trends are likely to drive increased demand for sporting goods. To capitalize on these opportunities, adidas and PUMA must adapt their strategies by strengthening their presence in Emerging Markets, tailoring product offerings to meet diverse consumer preferences, and building resilient supply chains that can withstand external shocks. Such proactive measures are essential for maintaining their competitive edge and achieving sustainable growth.

Global Sporting Goods Industry

The sporting goods industry, where adidas and PUMA compete, revolves around the production and distribution of athletic and sports lifestyle products. Given the intense competition and the significant influence of market trends and external risks, a thorough industry analysis is

essential to understanding how these companies can sustain and potentially enhance their market positions.

Market Development

The global sportswear market is expected to grow at a compound annual growth rate (CAGR) of 3.8% until 2028 (Euromonitor International 2024), aligning with global GDP growth. Industry players anticipate improvements in sales and margins (Becker et al. 2024). This expansion is driven by post-pandemic consumer habits, including the work-from-home culture, casualization, and a heightened focus on fitness, which have increased demand in 2021 (Linares 2023). Although inflation in 2022 temporarily reduced spending on non-essential goods, the industry rebounded in 2023 with 2.8% real growth, adjusted for fixed 2023-euro rates. However, demand varies across markets, requiring companies to adapt their strategies to local conditions to seize growth opportunities (Becker et al. 2024). Europe, for instance, is recovering from a 0.4% decline in 2023, while North America is stabilizing after inflation-driven caution among consumers. The Chinese market experienced strong growth of 13.6% in 2023 following the lifting of pandemic restrictions. However, its growth rate is expected to moderate to an average 5.4% through 2028. Other key regions, such as the Asia-Pacific excluding China, and Latin America, are projected to lead global growth with CAGRs of 5.6% and 3.5%, respectively, between 2023 and 2028, positioning them as prime areas for future investment.

Market Drivers

Market growth in the sporting goods industry is primarily driven by Emerging Markets, where rising GDP levels correlate with increased consumer spending (International Monetary Fund 2024a). For global brands, this requires tailoring product portfolios to meet diverse regional and cultural preferences. Demographic trends further influence demand, with an aging population favoring comfortable sportswear and younger generations emphasizing style and self-expression (Akin 2023). Additionally, major sporting events such as the Olympics, FIFA

World Cup, and UEFA tournaments play a pivotal role in boosting sales of branded sportswear, enhancing brand visibility, and fostering consumer engagement (adidas 2024a, 164). Companies such as adidas and PUMA have maintained their dominance by sponsoring prominent teams and athletes, leveraging these events to strengthen their global presence. Furthermore, government policies influence industry growth, ranging from direct subsidies for domestic brands in China to public health initiatives in Europe and Latin America that encourage greater sports participation (European Commission 2024; Liao 2024).

Competitive Landscape

The global sportswear market is characterized by fierce competition. Adidas is the second-largest player globally, holding an 8.3% market share in 2023, while PUMA ranks fifth with a 2.6% share (Euromonitor International 2024). The top ten companies control 45% of the global market, while in most regions, except for China, the three largest competitors already capture an average market share of 30.2%, further underlining the dominance of the big players (Table 1). Nike maintains a dominant position as the leading player in all major markets. Adidas ranks as the second-largest sportswear company across all regions, except for China. PUMA holds a solid market position, particularly in Europe, Latin America, and the Asia-Pacific region. However, in the Chinese market, local competitors benefit from significant influence. In 2023, Chinese companies Anta and Li Ning together captured 28.6% of the market. This competitive landscape has pushed PUMA out of the top ten in Greater China, while adidas retains third place behind Anta. A similar trend is observed in Asia-Pacific, where half of the top ten brands are regional players, emphasizing the competitive advantage of local firms. These rankings in Asia highlight opportunities for global players like adidas and PUMA to improve their standing, potentially by increasing collaborations with local athletes to boost brand visibility and consumer engagement (Becker et al. 2024). In contrast, in Europe, North America, and Latin America, global companies maintain a strong presence, with relatively balanced competition

among international players. Local competitors in these regions often thrive in niche markets, leveraging strong brand loyalty (Singh 2023). Additionally, the rise of agile start-ups targeting underserved segments with innovative products presents a challenge for established brands, as these newcomers cater to specific consumer needs (OECD 2024).

Opportunities and Challenges shaping the Future of the Industry

A variety of trends and risks can influence the business prospects of players in the sporting goods industry, creating both challenges and growth opportunities for adidas and PUMA. By proactively addressing these trends and risks, they can strengthen their market positions.

From a consumer perspective, shifting preferences are evident, particularly toward casualization (Becker et al. 2024). Athleisure, combining style and functionality for everyday wear, appeals to sports-conscious consumers and reflects their athletic lifestyle. Retro-inspired products are also gaining popularity, while smart clothing, incorporating technologies like performance-enhancing apparel, is becoming increasingly attractive (Singh 2023).

The COVID-19 pandemic has amplified global interest in sports and fitness, leading to consistently high participation in accessible and social activities such as running, yoga, and climbing, which in turn drives demand for associated products (Becker et al. 2024). Additionally, the pandemic reinforced the societal focus on health and wellness, creating new opportunities for companies to align with this trend by offering services like coaching and health-focused products (Linares 2023).

In addition, consumers are prioritizing sustainability, prompting companies to adopt eco-friendly practices such as the use of recycled materials and the reduction of their carbon footprints (Singh 2023). Regulatory pressures, including mandatory sustainability reporting in Europe, have further intensified the need for sustainable practices (Becker et al. 2024). Both adidas and PUMA have embraced sustainability, incorporating it into their business models and regularly reporting on their progress.

Moreover, the rising prominence of women's sports presents growth opportunities. Companies are responding with gender-inclusive products and expanded marketing efforts targeting female athletes and fans. For example, audience attendance for women's NCAA basketball increased by 89%, and initiatives for gender equality among athletes at the Paris Olympics highlight this trend (Linares 2024). Still, men's sportswear accounted for 51.2% of revenue in 2023, with Europe and the Rest of the World leading in women's sportswear at 39%, while China showed the lowest penetration (Euromonitor International 2024). Expanding women-specific product lines and actively promoting women's sports could enhance both market share and brand image.

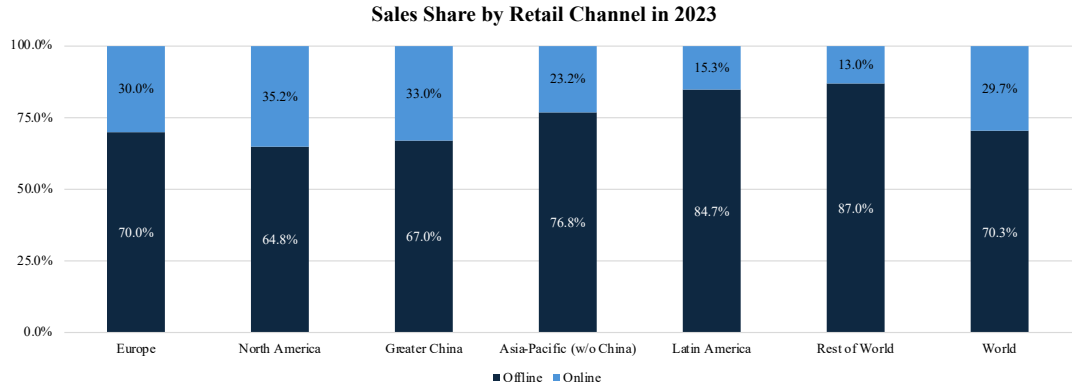

Figure 4: Sales Share by Retail Channel in 2023 (Euromonitor International 2024)

Digitalization continues to reshape retail, with e-commerce accounting for 29.7% of market sales in 2023 and growing, particularly in developed regions and Greater China (Figure 4). The COVID-19 pandemic accelerated this trend, requiring companies to enhance their online presence (Singh 2023). Although Latin America and other Emerging Markets lag behind, consumer preferences, especially among younger demographics, indicate further growth in e-commerce.

However, the industry's growth is constrained by certain challenges. Economic sensitivity remains a key risk, as downturns can weaken consumer spending and brand loyalty (Becker et al. 2024). Younger consumers, who are a priority for many brands, demand sustained marketing efforts to maintain engagement. While leading companies like adidas and PUMA are somewhat resilient, they must adapt to a landscape increasingly shaped by sustainability and consumer

trust. Notably, anti-ESG movements, particularly in the US, have politicized sustainability efforts, leading to resistance from policymakers, investors, and consumers (Thomson Reuters Institute 2023; Bradley 2024). This backlash could impact how adidas and PUMA implement and communicate their sustainability strategies, influencing their reputation and market appeal. Additionally, inventory management remains a significant challenge, as unpredictable demand patterns since the pandemic have heightened the risk of overstocking (Becker et al. 2024). To address this, companies are turning to artificial intelligence (AI) and machine learning to enhance inventory forecasting and mitigate these risks (Becker et al. 2024).

Market Perception in the Industry

The sporting goods industry is shaped by consumer preferences that balance traditional and modern values. Global players like adidas and Nike are renowned for quality, trustworthiness, and value (Vukasović and Petrič 2022, 78). Although brand loyalty plays a key role, factors such as availability and convenience can still drive consumers to opt for alternative brands. With most purchases occurring in physical stores (Figure 4), in-store marketing plays a vital role in attracting impulsive shoppers. Positive in-store experiences and high product quality often drive repeat purchases, while price sensitivity tends to be secondary (Vukasović and Petrič 2022, 79). Additionally, recommendations from personal networks and mass media have a greater influence on purchasing decisions than social media or print advertising (Vukasović and Petrič 2022, 79), highlighting the importance of credibility in brand communication. These findings emphasize the importance for companies in this competitive industry to prioritize product quality, enhance the in-store shopping experience, and ensure product availability to build customer loyalty and capitalize on market opportunities.

Alongside traditional values, research shows that consumers increasingly prioritize how companies address sustainability and social issues, such as equality, diversity, and inclusion. Companies that effectively communicate and demonstrate meaningful action on these ethical

concerns are slightly more favored by sport fans than by the general public (YouGov 2023). This underscores that consumer preferences extend beyond product offerings. Customers seek brands that align with societal values, demonstrate authenticity, and actively contribute to building a sustainable future. A survey confirmed a significant correlation between ESG-related claims and consumer purchasing behavior, showing that 78% of consumers worldwide prefer environmentally friendly products, and 72% are willing to pay a premium for sustainable goods (Bar Am et al. 2023).

In conclusion, the market perception is defined by a blend of traditional values like quality and trust, and modern values like sustainability and social responsibility. Balancing these aspects enables companies to strengthen their market position and gain a competitive edge.

Segmental Analysis by Product

In their external reporting, adidas and PUMA divide their business into the three product segments footwear, apparel, and accessories, ranked by sales share. As footwear and apparel dominate the industry, their performance is analyzed in greater detail below.

In 2023, global sportswear sales consisted of 58.4% apparel and 41.6% footwear (Figure 7). This product distribution is projected to remain stable through 2028. Following the exceptional post-pandemic growth in both segments, moderate growth is forecast from 2023 onward. Footwear is expected to grow slightly faster, with a CAGR of 4.1% from 2023 to 2028, compared to 3.5% for apparel, supported by increased consumer spending (Table 2). Regionally, there are notable differences. The global trend mirrors that of Europe and the Rest of the World, while North America generates 67.8% of sales from apparel, with both segments growing at similar rates of 3.4% to 3.5%. In 2023, North America accounted for nearly half of the total sports apparel market but held a smaller share of the sports footwear market at 30.9%, indicating more balanced distribution between advanced and Emerging Markets (Figure 8 and Figure 9). In contrast, Greater China showed a reversed revenue split, with footwear accounting

for 57.9% and apparel 42.1%, reflecting distinct regional preferences. After a sharp decline in 2022 due to economic uncertainty, Greater China experienced a rebound with double-digit growth in 2023, followed by above-average growth expected across both categories during the forecast period. The rest of Asia-Pacific achieved relatively even revenue distribution across both segments, with strong but slightly declining growth rates. Notably, Asia-Pacific, including Greater China, dominated the global sports footwear market with 32.8% share in 2023, a share expected to grow further until 2028, while Europe's share continues to decline. In Latin America, footwear generated 67.9% of revenue, with this share expected to expand further. Following robust double-digit growth of 15.2% in 2023, Latin America's growth rate is projected to moderate to 3.7% annually, while apparel growth remains steadier but less pronounced.

A key trend shaping the industry is the growing demand for athleisure, which is projected to grow at a CAGR of 9.3% through 2028, driving global sportswear growth (Euromonitor International 2024).

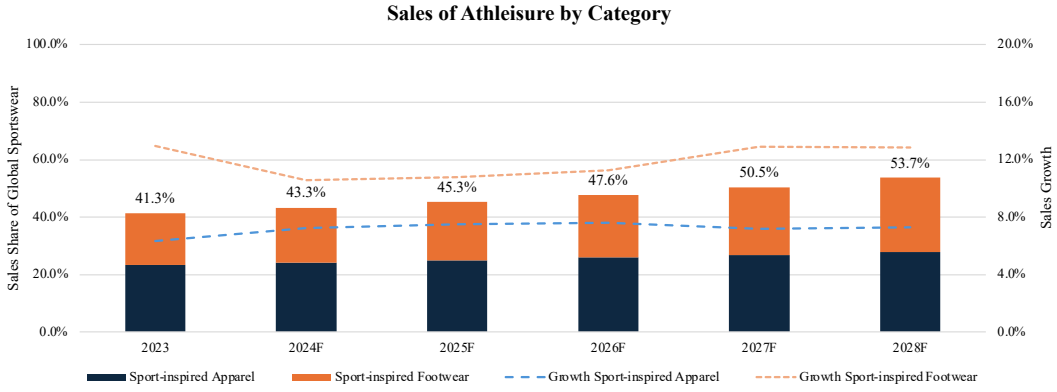

Figure 5: Sales of Athleisure by Category (Euromonitor International 2024)

This trend is reflected in the increasing share of athleisure footwear and apparel, classified as sport-inspired alongside performance and outdoor sportswear, within the overall market. Athleisure's share is projected to grow from 41.3% in 2023 to over half of the market by 2028 (Figure 5). Sport-inspired footwear slightly outpaced apparel in 2023 and is forecast to grow at a robust CAGR of 11.7% through 2028. By 2028, 61.1% of total sports footwear will belong to

the athleisure category (Table 3). Meanwhile, sport-inspired apparel is growing at a more moderate pace, with its share projected to remain just below half of total sports apparel by 2028.

Key Findings of Global Sporting Goods Industry

In conclusion, the global sporting goods industry continues to grow, driven by several key trends. These include growing demand in Emerging Markets, particularly in Asia-Pacific and Latin America, alongside an increasing consumer preference for athleisure products. Sustainability and inclusivity are becoming central priorities, complemented by a continued shift toward digital transformation and e-commerce growth. Despite these opportunities, the market remains highly competitive, requiring companies to stay agile and innovative to navigate shifting economic conditions and evolving consumer preferences. For adidas and PUMA, these trends highlight critical focus areas. Both companies must capitalize on the growing athleisure segment, strengthen their digital channels, and align their product offerings with consumer values such as sustainability and inclusivity. In particular, seizing opportunities in Emerging Markets like Asia-Pacific and Latin America will be crucial for their growth. By aligning their strategies with these industry dynamics, adidas and PUMA can strengthen their competitive positioning in an increasingly dynamic market landscape.

Valuation of adidas and PUMA

To determine the long-term enterprise value of adidas and PUMA, both cash flow-based and relative valuation were performed. The resulting share price is compared to the current stock price to assess whether the stock is overvalued or undervalued. A sensitivity analysis is conducted for each method, using key value drivers to account for uncertainties in the assumptions. All valuations are carried out as of June 30, 2024, reflecting the most recent business figures available for both companies. The discount rates used to determine enterprise value, along with the methodologies applied, are explained in greater detail below to ensure

that a well-founded investment decision can be made.

Discount Rate

The forecasted future cash flows must be discounted at an appropriate discount rate to calculate a final enterprise value (Schmidlin 2012). The cost of capital, which represents the minimum return required to finance operations before generating added value, helps investors to determine the financial risk of an investment and its potential returns (Saalmuller 2022). The WACC is the most commonly used method for determining the cost of capital in enterprise DCF valuations. It incorporates all financing sources by weighting equity and debt according to their respective market values (CFI 2024c). The WACC comprises three key components namely cost of equity, after-tax cost of debt, and the targeted capital structure. Each element and its application for adidas and PUMA is further discussed for clarity.

Cost of Equity

The cost of equity represents the rate of return that is expected by equity investors (Saalmuller 2022). In practice, it is typically calculated using the Capital Asset Pricing Model (CAPM), which measures the riskiness of an investment compared to the market (Saalmuller 2022).

The risk-free interest rate, which assumes neither default risk nor reinvestment risk, is usually determined using the return of a long-term government bond (Damodaran 2008). As this pairs trade investment strategy targets a global audience, it is crucial to select an appropriate risk-free interest rate. Due to its high liquidity, the 10-year US treasury bond serves as a proxy for the global benchmark. However, as the valuation is conducted in EUR, the US risk-free rate on the valuation date of 4.4% is converted using the 10-year cross-currency basis swap spread. The approximated global risk-free interest rate, quoted in EUR, therefore amounts to 4.25% (Bloomberg 2024).

Furthermore, beta quantifies the sensitivity of a company's stock to market movements, measuring its systematic risk relative to the broader market (CFI 2024b). Unsystematic risk,

being company-specific, can be mitigated through portfolio diversification and is therefore excluded from this analysis (CFI 2024b). For adidas and PUMA, the equity beta was calculated using a regression of their respective daily returns from mid-2021 to mid-2024 against market returns. Three indices, representing distinct market segments, were selected for this analysis. The Deutscher Aktienindex, representing the German market, was included as both adidas and PUMA are headquartered in Germany, despite the index's relatively small size. The Euro Stoxx 50, which encompasses major companies within the eurozone, was included due to Europe's status as one of the most significant markets for both companies. Finally, the Morgan Stanley Capital International World index was chosen to represent the global developed market, reflecting the companies' global operations and exposure to global economic conditions. The average beta from regressions against these indices was calculated for each stock. The historically levered betas were adjusted towards the market average of one (CFI 2024a) to estimate future betas, as adidas and PUMA are expected to grow in size. This results in an adjusted beta of 1.02 for adidas and 0.98 for PUMA. To reflect the targeted capital structure in the WACC, the betas were first unlevered with the capital structures on the valuation date and then re-levered to the new financial structures. This results in a levered beta of 1.08 for adidas and 1.03 for PUMA, indicating that adidas is slightly more volatile than the market, while PUMA is marginally less risky. When considering operational risk using the unlevered betas, assuming no debt, the sensitivity of the two companies appears to be very similar. This reflects the fact that the core businesses are the same and therefore their operations are exposed to almost identical risks. Consequently, differences in stock performance are primarily due to variations in capital structure and strategic measures.

The market risk premium represents the expected excess return of the market portfolio over a risk-free investment, compensating investors for taking on additional risk (Saalmuller 2022). To maintain consistency with the perspective of the risk-free rate, the global equity risk

premium, weighted by regional GDP, was 5.5% as of the valuation date (Damodaran 2024a). Based on the CAPM, the cost of unlevered equity is 9.4% for adidas and 8.8% for PUMA. Given their updated capital structures, investors demand a 10.2% return on adidas' stock to compensate for its market risk, while a 10.1% return is required for PUMA's stock.

Cost of Debt

The cost of debt represents the pretax interest rate that a company pays on its borrowed capital (Saalmuller 2022). This compensates creditors for the risks of lending (CFI 2024d). Therefore, the interest rate reflects the company's default risk. There are different approaches to determine the cost of debt. For companies with observable market debt, the current yield to maturity of the company's debt can be used (Damodaran 2024d). This approach was applied to adidas. The bond with the longest maturity, in this case 15 years, was chosen to align with the long-term valuation horizon. The bond's yield to maturity is 3.0% (TradingView 2024). The default spread is derived from the difference between the bond's yield and the 10-year German government bond yield of 2.5% on the valuation date (TRADING ECONOMICS 2024), which serves as the risk-free rate for the company bond listed in Germany. This results in a default spread of 0.6% and an overall cost of debt of 4.8% for adidas. For companies without outstanding market debt, the cost of debt can be estimated by calculating a synthetic credit rating based on financial ratios, such as the interest coverage ratio (Damodaran 2024d). This method was applied to PUMA, which currently has no outstanding market debt. In 2023, PUMA's interest coverage ratio of 11.7 corresponds to a credit rating of AAA based on the scale for large-cap firms (Damodaran 2024b). Consequently, a default spread of 0.75% was applied, resulting in a cost of debt of 5.0%.

The after-tax cost of debt, which incorporates the tax benefits known as the interest tax shield from corporate bonds, is applied in the WACC calculation. No changes are expected in the tax rates of the two companies, as they have remained constant over the last four years. Therefore,

a tax rate of 27.4% is assumed for adidas and of 27.2% for PUMA. The similarity in tax rates can be explained by shared business, geographical, structural, and tax conditions. After incorporating tax benefits, the after-tax cost of debt is 3.5% for adidas and 3.6% for PUMA.

Targeted Capital Structure

The capital structure that companies adopt to finance their operations has a major impact on their cost of capital. Well-established companies like adidas and PUMA tend to be in a better position for higher leverage. The targeted capital structure of adidas and PUMA was determined by analyzing their current market value-based structure (Table 4), the industry benchmark, and company-specific investment plans. A constant D/E ratio is assumed for both companies. For a fair estimation of the market value of adidas' and PUMA's debt, the carrying amounts of the net financial debt were used. The market value of equity is calculated by multiplying the number of shares outstanding by the share price on the valuation date. Adidas' current capital structure averaged 11.8% debt from 2021 to 2024, with a peak of 19.9%, a low of 4.2%, and 9.1% as of June 30, 2024. The number of outstanding shares and net financial debt were relatively constant during this period, with the ratio primarily influenced by share price fluctuations. The target is an increase in D/EV ratio from 9.1% in the first half of 2024 to 15%. This rise is supported by its strong investment-grade rating and stable future cash flows, which make it well positioned to increase leverage. In addition, the company intends to invest further in the business, which will require additional financing. Adidas' current D/E ratio of 10.1%, significantly below the industry average of 47.7%, suggests the company is underleveraged, with room to increase leverage and enhance financial efficiency. PUMA has an average debt of 11.5% of the total enterprise value. A steady increase to 17.2% was reported by mid-2024, due to a slight increase in net financial debt and a simultaneous decrease in its share price. The current D/E ratio of 20.8% is already higher than that of adidas, but remains well below the industry benchmark, indicating potential to increase leverage. Furthermore, PUMA operates on a much smaller scale

than adidas, which means that additional leverage can enable PUMA to finance growth initiatives and expand its business, aligning with its already announced investment plans. A D/EV ratio of 25% is targeted and factored into the WACC. For both companies, raising additional debt could increase their D/E ratios, enhancing ROE and potentially improving their attractiveness to investors.

Weighted Average Cost of Capital

The WACC is calculated using the cost of equity, cost of debt, and targeted capital structure for each company (Table 5). For adidas, the WACC is 9.2%, while for PUMA it is lower at 8.5%. Adidas' higher WACC is primarily driven by its elevated cost of equity, reflecting greater volatility relative to the market, and its lower reliance on debt. This makes it more challenging for adidas to achieve returns above its cost of capital. In contrast, PUMA benefits from a more balanced D/E ratio and a slightly better risk profile than adidas. PUMA's ability to utilize capital more efficiently than adidas is reflected in its lower WACC, which provides a competitive advantage.

Cash Flow-based Valuation

The DCF method estimates enterprise value using projected cash flows and growth, with risk captured by the discount rate (Damodaran 2024c). For adidas and PUMA, the UFCFs from 2024 to 2030 were used (Table 6 and Table 7). Beyond the forecast period, the companies are assumed to operate in a stable environment with cash flows valued using a perpetuity-based continuing value. The terminal value is a critical component of the valuation, as it represents a substantial component of the total enterprise value. This approach is particularly suitable for companies that pursue a target capital structure (Damodaran 2024c). Given the assumption of a constant D/EV ratio for adidas and PUMA going forward, it appears reasonable to use this method to define the value of both companies. The final enterprise value is determined by discounting the core UFCFs of the forecast period and the terminal value and then adding the

non-core UFCFs. The market value of equity is calculated by subtracting net debt including non-controlling interests, as defined by the targeted D/EV ratio. The share price is then derived by dividing the market value of equity by the number of outstanding shares, which is assumed to remain constant as no changes have been announced by adidas or PUMA. The share prices are further analyzed using a sensitivity analysis to assess the impact of key assumptions. The WACC and terminal growth rate, based on forward-looking assumptions about capital costs, returns, and growth, are varied by ±0.2%. These key variables are particularly suitable for sensitivity analysis, as small changes significantly affect both the forecasted enterprise value and the terminal value, which constitutes a major portion of it. This allows for a better assessment of uncertainties in financing costs and growth assumptions, verifying the robustness of the valuation.

As of June 30, 2024, adidas' enterprise value of operations is EUR 28,343 million (Table 8). Of this total, 76.2% comes from the discounted terminal value, calculated using a perpetual growth rate of 4.4%, while the remaining 23.8% is attributed to the forecast period. After considering the non-operating UFCF at market value and deducting net debt of 15%, the equity value available to shareholders on the valuation date is EUR 24,091 million. With currently 178.55 million shares outstanding, the enterprise DCF method indicates a 39.5% downside from the market share price of EUR 223 on June 30, 2024. Therefore, the enterprise DCF indicates that adidas is significantly overvalued in the market, as the projected growth in core UFCFs does not support the current share price. PUMA's business is significantly smaller than adidas, as reflected in its core UFCFs. Its enterprise value from the operating business amounts to EUR 11,238 million (Table 9), representing 39.9% of adidas' enterprise value. While PUMA's perpetual growth rate of 3.9% is slightly lower than adidas', its terminal value plays a more important role, accounting for 84.4% of the core enterprise value, due to PUMA's lower risk profile. Additionally, the non-operating business is valued at EUR 94 million. After deducting

25% net debt, the equity value is EUR 8,499 million, corresponding to a share price of EUR 56.95, a potential increase of 32.8% compared to the current market price as of mid-2024.

In conclusion, both companies are growing steadily within the projected period, considering their difference in scale. However, PUMA offers a more favorable opportunity for investors with an appreciation in the current share price, while adidas may be significantly overvalued.

The sensitivity analysis of the enterprise DCF method demonstrates that adidas and PUMA are more sensitive to fluctuations in the WACC than in the terminal growth rate (Table 10 and Table 11), which indicates that both companies are more dependent on macroeconomic factors such as interest rates and capital market risks. Changes in the global financial markets could therefore have a major impact on their valuation. For adidas, the sensitivity analysis suggests that a potential undervaluation is unlikely. Even with a 0.8% reduction in the WACC and a simultaneous 0.8% increase in growth after the forecast period, the resulting share price is EUR 195.30. This remains well below the current market price of EUR 223, signaling limited upside potential in the valuation of adidas. This suggests that although adidas' valuation responds positively to improvements in both variables, its stock price would still reflect a loss of 12.4% even under highly favorable conditions. Thus, moderate improvements are insufficient to justify a buy recommendation for adidas. In contrast, the sensitivity analysis suggests that PUMA may be slightly overvalued under certain conditions. If the WACC increases by 0.8% and the terminal growth rate decreases by 0.8%, the resulting share price would be 0.4% lower than the current market price of EUR 42.87, indicating minimal downside risk. Conversely, if both key variables improve, PUMA's share price could rise to EUR 86.42, reflecting a potential upside of 101.6%. This makes PUMA an attractive investment opportunity for investors anticipating favorable market conditions.

Relative Valuation

Relative valuation, unlike intrinsic valuation, assesses a company's value based on the current

market prices of comparable companies (Damodaran 2024c). The market prices of a peer group are converted into multiples of common variables representative of adidas' and PUMA's enterprise value. This method is less time- and resource-intensive, easier to apply, and more intuitive than the cash flow-based approach, as it reflects the current market sentiment (Damodaran 2024c). In addition, some multiples serve as an important decision-making basis for investors (CFI 2024e). However, relative valuation often provides only a snapshot of the company's current status and does not include future forecasts. This limitation can be mitigated by using forward-looking multiples instead of current ones. In addition, there may be a lack of transparency in determining the multiples and the valuation may lead to distorted results due to an over- or undervaluation of the market (CFI 2024e). To minimize the risk of incorrect investment decisions, multiples valuation should complement, rather than replace, cash flow-based methods.

Two steps in particular are essential for conducting a robust valuation (Damodaran 2024c). First, the peer group for adidas and PUMA must be determined. For this purpose, publicly listed competitors within the same industry and with similar fundamentals such as operations, product portfolio, market presence, profitability, growth, and risk are selected. Since both companies operate globally and are positioned among the top ten globally, the peer group includes Nike, Under Armour, lululemon, VF Corporation, Skechers, Anta, Li Ning, and Asics. Under Armour and VF Corporation were excluded due to losses in their last fiscal year, which hinder comparability. The second step involves adjusting market prices to standardized variables. There are a large number of multiples that can be used. For adidas and PUMA, three multiples, divided into the categories equity and enterprise value, proved to be the most useful. It is particularly important that the multiples are consistent. Depending on the category, the value in the numerator and the standardized variable in the denominator must correspond to the same claim holders of the company, either equity holders or equity and debt holders. The price-to-

earnings (P/E) ratio is the most widely used equity multiple (Damodaran 2024c). However, when comparing this within the industry, it should be noted that this category includes different levels of debt. To eliminate the effect of debt financing and disregard the capital structure, enterprise value multiples are used in addition (CFI 2024e). For this purpose, the enterprise value-to-EBIT (EV/EBIT) and enterprise value-to-revenue (EV/Revenue) ratios are applied to adidas and PUMA. The latter is the least affected by the accounting rules of the individual peer companies. The comparability of the individual multiples shows that the profit-related multiples of adidas are extraordinarily high. This is due to the losses in 2023, which are not representative of the future performance of the business. For instance, adidas' EV/EBIT ratio was 201.7x, significantly inflated by weak profits in that year. To maintain comparability and preserve the integrity of both companies throughout this analysis, adidas is included in PUMA's peer group, even though its 2023 results were atypical. To mitigate the effect of outliers and adjust for skewed distribution, the median is used to determine the industry indicators.

The low earnings and efficiency of adidas in 2023 are reflected in a weak enterprise value (Table 12). The median share price of the three multiples is EUR 25.22, which signals a current overvaluation of 88.7%, and is significantly below the result from the cash flow-based valuations. The sensitivity analysis, with a median-based fair market value deviation of ±10%, also indicates a potential downside risk of at least 87.6% for adidas' price. Excluding the earnings multiples, the EV/Revenue multiple still leads to a downside of 8.0%, with a share price of EUR 205.23. Since historical data includes losses and is not representative, multiples should be applied to the forecasted year-end 2024. The analysis then shows that adidas is still significantly overvalued, with a 52.6% overvaluation compared to the share price at the valuation date. Consistent with the previous valuation method, the multiples valuation for PUMA issues a clear buy signal. The application of the fair market multiples results in a median share price of EUR 51.02 for PUMA, corresponding to an upside potential of 19.0% (Table 13).

The valuation of PUMA is also confirmed in the best- and worst-case.

Key Findings of Valuation

The valuation highlights adidas' higher WACC compared to PUMA's, driven by adidas' greater market volatility and less efficient capital structure, which increase its risk for investors. The enterprise DCF method shows that adidas is overvalued, with a 39.5% downside, whereas PUMA offers a 32.8% upside. The relative valuation further reinforces these results, with adidas displaying inflated multiples, while PUMA remains attractively undervalued. The sensitivity analyses underscore the resilience and growth potential of PUMA.

Scenario Analysis

The scenario analysis assesses the impact of key value drivers on the financial performance of adidas and PUMA under three scenarios, focusing on major market drivers that could influence the pairs trade recommendation. The particular focus lies on the implications of their post-pandemic revenue growth and EBIT margin correlations. The strong revenue growth and moderate EBIT margin correlations emphasize the importance of considering the interdependencies between the two companies when analyzing potential scenarios, ensuring that assumptions about their performance are aligned.

Scenario 1 – Trump's Presidential Election of the US and his Tariff Policy on Imports

Donald Trump's re-election on November 6, 2024, marks a pivotal moment with significant implications for global markets and company valuations worldwide. Although both adidas and PUMA are headquartered in Germany, as one of the world's largest economies, the US exerts considerable influence over trade, monetary policy, and global economic stability, especially as Trump's trade policies could negatively impact the world (Wolf 2024). A central component of Trump's economic policy includes imposing tariffs, with rates as high as 20% on imports from most countries and up to 60% on imports from China (Wolf 2024). The proposed tariffs

could lead to increased costs, which may be passed on to consumers, thereby affecting demand. Analysts have expressed concerns that these two German companies could soon face higher tariffs on their US business (DPA 2024). The overall impact on revenue remains uncertain, as it depends on consumer responses to price changes and the companies' abilities to mitigate increased costs. However, the initial impact on North American revenue is expected to be significant for both companies, due to tariffs, reduced consumer spending, and increased prices. This aligns with the high historical correlation of revenue growth, as the companies are expected to respond similarly to a shared external shock.

PUMA's total revenue is projected to decline by 16% in 2025, slightly steeper than adidas' 13% decline, reflecting PUMA's higher reliance on North American sales versus adidas' broader global footprint and stronger brand positioning (Table 14 and Table 15). As the companies begin adapting by diversifying supply chains or sourcing locally to mitigate tariff impacts, following Steve Madden's model of reducing reliance on Chinese production (Goldman 2024), it can be assumed that the revenue declines moderates by 2026, with further stabilization by 2027 and recovery to pre-tariff levels by 2030.

Additionally, tariffs may prompt Chinese manufacturers to target European markets to offset losses from the US, which would increase competition, particularly in the footwear sector, where Chinese products could be seen as lower-cost alternatives (Martuscelli 2024). As a result, the European market is expected to decline in parallel, with adidas being less affected due to its stronger brand loyalty in its top-selling region and its resilience to price pressure. The impact on sales is expected to be relatively moderate, with a 3% decline for adidas and 5% for PUMA in 2025, as both will be able to maintain brand loyalty. In the medium term, the decline may accelerate to 6% and 8% respectively, due to increased competition from Chinese brands. By 2027, market dynamics are expected to stabilize as both companies innovate, leading to a smaller decline of 2% in the following years, with no further impact expected by 2029.

The trend in COGS for adidas and PUMA would likely follow a multi-year pattern similar to the revenue decline trend, with an initial spike in COGS due to tariffs in 2025, followed by gradual stabilization until 2028 as supply chain adaptations come into effect. Assuming no immediate alternative supply sources, COGS of products sourced from China may increase by 9% in 2025 for both companies. With 32% of production being based in China, PUMA's COGS would see an immediate rise due to its greater reliance on Chinese products and thus higher import costs. However, as adidas sources only 16% of its supplies from China, its overall reliance on Chinese manufacturing is lower. As a result, while both companies face the same tariff impact on Chinese imports, the overall increase in adidas' total COGS would be proportionally smaller than PUMA's due to its more diversified supply chain. From 2026 to 2028, COGS could potentially return to pre-tariff levels as companies shift production to countries less affected by tariffs.

Moreover, both companies are expected to incur supply chain adjustment costs to diversify or relocate their production. These costs will primarily appear in Operating Expenses, specifically under G&A, with temporary increases in Sales and Distribution Expenses due to higher logistics and shipping costs associated with new sourcing locations. The increase in costs is less severe for adidas, as it had strategically planned to cease sourcing US goods from China (Scott 2024). However, the difference is not significant, as PUMA's smaller number of facilities and lower trading volumes make relocating factories comparatively easier.

Overall, PUMA's EBIT margins are expected to decline more sharply than adidas' due to operational factors and different cost structures, such as PUMA's higher reliance on North American sales, Chinese imports, and associated tariff costs. In 2025, PUMA's margin is projected to drop by 2.8 percentage points, while adidas experiences a smaller decline by 2.0 percentage points, reflecting its lower sales and cost pressures. As both companies adjust supply chains and reduce dependency on Chinese manufacturing, the margin impact moderates, with

PUMA showing a 0.7 percentage point decline by 2028 and adidas a 0.4 percentage point decline. By 2029, both companies stabilize close to pre-tariff margin levels.

The rise in PPE due to increased CAPEX reflects the necessary investments in relocating or setting up new factories outside of China, with an assumed 1% increase from 2025 to 2028 for adidas and a 2% increase for PUMA, reflecting its higher dependency on Chinese production.

Ultimately, Trump's policies are expected to lower core UFCFs of both adidas and PUMA from 2025 to 2028, the period of his administration. However, these effects are largely temporary and are expected to have a minimal impact on their long-term valuations. PUMA's core UFCF is projected to turn negative in 2025 and 2026, driven by core EBIT declines, with an estimated reduction of 41.1% compared to 2024, attributed to increased operational costs and competitive pressures in key markets. Additionally, higher cash adjustments, mainly from increased CAPEX investments and a smaller reduction in NWC, are expected to further impact cash flows during these years. In contrast, adidas is forecast to maintain positive UFCF, albeit at a lower level, throughout this period. Its diversified business model and broader market reach provide resilience against market fluctuations and trade-related challenges, allowing adidas to sustain core EBIT, which is expected to decrease by 25.2% in 2025 and mitigate the impact on cash flows despite the political headwinds. PUMA, despite greater exposure to this scenario, faces relatively modest impact on its share price, which is expected to decline by only 6.4%. This suggests a potential undervaluation of 24.3%, even after adjusting for policy-driven effects. As for adidas, although less impacted operationally, a smaller decline of 4.9% is expected, positioning its share price as overvalued by 42.5%, reflecting no change in the final recommendation. This scenario has a high likelihood of materializing, as Trump's trade policies, well-established during his first term as US president, have since been reinforced.

Scenario 2 –The Rising Importance of Sustainability

Adidas and PUMA have taken different approaches to sustainability, particularly in terms of

reducing Scope 1, 2, and 3 emissions. PUMA has pursued a more aggressive approach to achieve significant and rapid reductions across all emission scopes, while adidas has adopted a more measured strategy, balancing sustainability goals with other business priorities. This difference is evident in their respective Carbon Disclosure Project climate scores, with adidas improving from a B-score in 2017 to an A- by 2023 (CDP 2024), while PUMA showed a greater commitment to sustainability, advancing from a C in 2017 to the highest possible score of A by 2023 (PUMA 2024a, 106). These contrasting strategies offer valuable insights into the performance of each company under varying future scenarios.

In the scenario where sustainability becomes a key source of competitive advantage driven by stricter regulations, evolving consumer awareness, and global climate agreements, the financial implications of carbon pricing will be significant (Table 16 and Table 17). By 2030, the average global carbon price is expected to reach USD 300 per ton of Carbon Dioxide (Systems Change Lab 2023). Under this high-carbon price scenario, adidas' and PUMA's emission reduction targets appear reasonable, as achieving them would help offset the substantial financial burden of rising carbon costs. Adidas aims to reduce GHG emissions across its entire value chain by 30% until 2030, measured against its 2017 baseline (adidas 2024a, 84). In contrast, PUMA has adopted a more ambitious approach targeting a 90% reduction in Scope 1 and 2 emissions and a 33% reduction in Scope 3 by 2030, similarly measured against 2017 (PUMA 2024a, 105), implying a total reduction across all scopes of 35%. PUMA's more aggressive approach to reduce emissions, particularly of Scope 3, which accounted for 97.3% of total GHG emissions for adidas and 99.4% for PUMA in 2023, positions the company to be significantly less impacted by this rise in carbon prices. The additional carbon emission costs will result in an increase in COGS and operating expenses, rising from 0.8% in 2024 to 1.7% in 2030 for PUMA, and more significantly from 1.6% to 3.5% for adidas. The post-pandemic EBIT margin correlation indicates that while both companies face similar pressures from rising carbon costs,

their sustainability strategies affect their cost structures differently. This difference in costs highlights PUMA's more proactive sustainability strategy and its relative advantage in mitigating the financial impact of rising carbon prices on the EBIT margin due to much lower total emissions. In contrast, adidas, with its slower progress in addressing sustainability challenges, will face more significant increases in operating costs and a greater impact on profitability.

Balancing the effect of increased carbon prices, both companies will benefit from the attraction of consumers to brands prioritizing eco-friendly products by actively reducing GHG emissions and adopting more sustainable production methods. Showcasing their commitment to sustainability offers the potential to gain market share in the growing market for environmentally responsible goods. The sustainable footwear market size per region has been analyzed using the regional CAGR (Grand View Research 2024b). For example, Greater China is projected to grow annually at 7.5% from 2024 to 2030, driven by the increasing prominence of sustainability on social media and other online platforms, which are reshaping consumers' perceptions of eco-friendly products. Similarly, Asia-Pacific, including Japan and South Korea, shows strong potential for sustainable growth at 7.1%, as this market offers favorable conditions for producing sustainable products while maintaining affordability. The sustainability trend reflects a shared macroeconomic impact on adidas and PUMA, with both potentially benefiting from increasing demand for eco-friendly products. However, the post-pandemic revenue growth correlation of 0.87 suggests that the impact on both will be similar in some respects but different in terms of market positioning. Adidas' stronger presence in these regions supports a 13.5% sales CAGR through 2030, compared to 11.9% for PUMA. However, PUMA's advanced sustainability efforts are expected to drive higher long-term growth, with a terminal growth rate of 1% compared to adidas' 0.5%.

From a valuation perspective, PUMA would benefit much more under this scenario due to its

higher sustainability efforts and lower emissions, as the cost increase is less detrimental than for adidas. PUMA's share price of EUR 57.52 indicates a 34.2% undervaluation while adidas' share price of EUR 65.13 suggests a 70.8% overvaluation. This disparity is driven by the higher carbon-related costs associated with adidas' larger GHG emissions and its slower progress in addressing sustainability challenges. If adidas does not take more decisive action, investors are likely to favor more eco-responsible competitors like PUMA. This becomes particularly critical in a future scenario where stricter regulations and consumer demand for sustainability redefine the competitive landscape.

In contrast, a less likely, but possible scenario, is that sustainability loses relevance or even becomes detrimental to the success of companies like adidas and PUMA (Table 18 and Table 19). This scenario stems primarily from Trump's recent victory, with his advocacy for anti-ESG rules, alongside geopolitical uncertainties leading to other important issues taking top priority. At the international level, a US withdrawal from the Paris Climate Agreement under Trump's leadership would not only lower US commitments but also undermine the resolve of other major emitters, such as China and India, to meet their pledges (Carlin 2024). For adidas and PUMA, this shift could ease the pressure to meet their ambitious emissions reduction targets, particularly for Scope 3, which is tied to supply chains in regions like Asia, where local environmental commitments might weaken. It is assumed that adidas will adjust its Scope 3 emissions reduction target from 30% to 10%, and PUMA from 33% to 15%. These changes are likely driven by expectations of weaker environmental regulations and reduced pressure to achieve aggressive sustainability goals, prompting both companies to scale back their targets while still focusing on emissions reduction in a more cost-conscious environment. However, Scope 1 and 2 emissions for internal operations, directly controlled by the companies, remain crucial. Reducing these emissions is, on the one hand, essential for aligning with ESG goals and, on the other hand, for driving cost savings and improving operational efficiency. Even in

a less ESG-focused environment, these reductions remain a key strategic priority for both companies. For PUMA, this means a 90% reduction of Scope 1 and 2 emissions by 2030, while a more conservative approach has been adopted for adidas. Adidas' Scope 1 and 2 emissions increased significantly by 171.4% from 2017 to 2023, making a 90% reduction by 2030 less feasible. Consequently, the target has been adjusted to 60%. Overall, the reduction of total emissions by 2030 is 10% for adidas and 17% for PUMA, which continues to represent PUMA's greater ESG commitment.

Simultaneously, in this scenario, climate damage is less penalized, and a lower carbon tax on emissions is expected, set at the global minimum price of USD 170 in 2030 (Systems Change Lab 2023). When sustainability is deprioritized compared to the opposite scenario, the operating and sales costs rise on average 0.6 percentage points less at adidas and 0.3 percentage points less at PUMA. PUMA's lower decline reflects higher risk and less flexibility to reduce costs as it allocates more resources to sustainability, whereas adidas' less aggressive approach allows greater cost-cutting flexibility, despite its total emission cost share remaining higher.

Moreover, a lower attraction to sustainability impacts the growth of sustainable products. Despite a global decline in ESG priority, Europe could continue to secure demand for sustainable products due to strict regulations and strong consumer expectations. Adidas and PUMA could maintain higher investments to adapt to local expectations, with PUMA having a competitive advantage. If Trump's policies lead to an easing of climate regulations and an aggressive request to rethink America's climate policy, sustainable products will completely lose their appeal in this market. In this context, a significant decline in demand in China and Asia-Pacific is assumed, by 4% each. In the remaining markets, a moderate decline of 2% is forecast due to a general reduction in sustainability and cost efficiencies. Overall, PUMA's CAGR from 2024 to 2030 is 2.8 percentage points lower compared to the scenario where sustainability gains importance, while adidas' is 3.2 percentage points lower. This small

difference suggests a similar impact from shifts in sustainability priorities due to their strong correlation, albeit shaped differently by their respective market positioning. Even in the long term, PUMA gains only a slight advantage due to the strong integration of sustainability into its corporate strategy, reflected in a modest increase of 0.5% in the terminal growth rate, resulting in 4.4%.

The reduced emphasis on sustainability, characterized by significantly lower carbon taxes despite higher emissions, leads to lower overall emissions costs for adidas. This positively impacts short-term profitability, on average by 0.6 percentage points per year, allowing the company to achieve slightly better EBIT margins compared to the opposite scenario. The substantial price reduction of USD 130 per ton of Carbon Dioxide more than offsets the impact of increased emissions caused by lower targets, as well as the loss of additional sales. This leads to a slightly better valuation of adidas compared to the opposite scenario, with an increase in share price of 19.4%, yet the stock remains overvalued by 65.1%. PUMA's margin, in contrast, faces immediate pressure as the losses due to lower consumer appeal in high-sales regions cannot offset the relatively high emission costs. This leads to a largely negative development of the EBIT margin by 1.8 percentage points in 2025, followed by a recovery of 0.3 percentage points per year. This divergence underscores the impact of their strategic differences in managing sustainability and cost pressures, as evidenced by the correlation. A lower share price for PUMA of 9.1% is reflected compared to the favorable sustainability scenario, still signaling a potential undervaluation of 21.9%. The significant integration of sustainability into PUMA's business model and the lead in emissions reduction could allow the company to maintain a cost advantage in the future if sustainability regains importance and requires less future reinvestment.

In both scenarios, the valuation results remain robust to changes in sustainability. It can be assumed that the sustainability trend will gain importance in the future with a probability of

65%, driven by global climate commitments of most stakeholders, evolving consumer values, and increasing environmental risks. PUMA's deeper ESG commitment provides a compelling long-term advantage in a strong ESG commitment scenario, supporting the portfolio's positioning. The occurrence of an anti-ESG scenario is expected to be 35%, which could result from potential changes in political power or economic pressure, thereby temporarily reducing the importance of ESG efforts. Nonetheless, the increased cost pressure on PUMA should be considered. Adidas' relative flexibility and immediate cost benefits could challenge the portfolio's short-term performance.

Scenario 3 – The Rise of Artificial Intelligence and E-Commerce

The final scenario explores the megatrend of technological development and the resulting opportunities for the global sporting goods industry, particularly through increased e-commerce sales and reduced overstocking. The use of advanced technologies, such as AI, can enable companies like adidas and PUMA to achieve both short- and long-term goals, ultimately gaining a competitive advantage (von der Gathen et al. 2024). Increased implementation can significantly impact the businesses in many ways (Table 20 and Table 21), with similar financial consequences due to shared business models. This scenario assumes a long-term impact starting from 2025 onwards, and the forecasts partly reflect the current level of technology adoption at adidas and PUMA. Adidas began addressing this megatrend several years ago by implementing adaptations across multiple areas of its business, while PUMA only began relevant implementations this year, focusing on e-commerce and inventory management. Firstly, by focusing on the expansion of e-commerce, both companies can reach a broader audience, allowing customers to shop at any time and from anywhere. By investing in digital infrastructure, AI-driven personalization, and mobile-friendly experiences, online shopping can be customized, improving decision-making, and ultimately enhancing customer understanding and loyalty for both adidas and PUMA (Sinha, Shastri, and Lorimer 2023). Additionally,

conversion rates are expected to improve, which is beneficial, as retaining customers is less expensive than acquiring new ones (von der Gathen et al. 2024). This is expected to increase the companies' e-commerce sales share, which were 20% for adidas and approximately 12.1% for PUMA in 2023. According to the "Own The Game" strategy, adidas' target for online sales is to reach EUR 9 billion in 2025 (Mixson 2022), which corresponds to a forecast share of 36.7%. Due to numerous investments in online sales, the share is expected to increase by 2% per year, as the company aims to generate predominantly digital sales and thus achieve nearly 50% by 2030. Similarly, PUMA expects a continuous increase in e-commerce sales over the next years as a result of the multi-year agreement with Google Cloud, which supports the optimization of e-commerce with AI (Google Cloud 2024). However, PUMA's sales are heavily driven by wholesale, which may limit the potential of this sales channel. With annual growth of 1%, PUMA aims to approach the global 2023 industry share of online sales of 29.7% in the long run (Euromonitor International 2024), which is important for its business growth. The scenario assumes that both companies benefit from the megatrend of e-commerce growth, aligning with the historical high correlation between them, while adidas is able to adopt more quickly, resulting in strategic divergence. The e-commerce sales forecast incorporates the regional CAGR of online footwear and apparel sales from 2025 to 2030. According to the market analysis, the global growth of 6.8% for footwear is two percentage points lower than for apparel purchased online (Grand View Research 2024a). The potential increase in sales leads to a CAGR from 2024 to 2030 of 10% for adidas and 7.5% for PUMA, indicating that adidas is leveraging AI technologies more effectively, while PUMA is slowed to implement them, partly due to its reliance on wholesale. In the long term, a 1% terminal growth rate increase is assumed for both, as strong investments in digital technologies can lead to greater and more efficient scaling of their business models.

However, increased R&D costs will be incurred for expanding e-commerce and investments in

other business areas where the introduction of AI will increase efficiency. R&D costs, which are linked to sales, are expected to increase in the short term, as companies seek to unlock optimization potential. Sustained effort in innovation is reflected in adidas' relatively stable R&D costs over the last ten years with a CAGR of 2% (adidas 2024b). For this reason, it is assumed that R&D costs will continue to grow constantly at this rate. PUMA, in contrast, has experienced a significant increase in R&D costs related to new technologies in the last two years (PUMA 2024b). To close the gap with competitors and capitalize on the AI megatrend, R&D costs for PUMA are projected to grow by 8.3% annually over the next four years, based on 2023 growth. The elevated costs will be gradually reduced by 1% annually starting in 2029. Capitalized investments in the latest technologies are included in the balance sheet within other intangible assets. For the integration of more efficient systems and software, an annual increase of 3% of sales for adidas, which aligns with planned investments in digital transformation of EUR 1 billion by 2025 (Mixson 2022), and 4% of sales for PUMA is assumed starting in 2025. With ongoing technological advancements, it is anticipated that systems such as Amazon Web Services, used for adidas' corporate infrastructure, and PUMA's warehouse management system, which is to be deployed in all regions soon, will require continuous updates. For PUMA, these investments are particularly critical, as this system has yet to be fully implemented across all company functions.

In addition, expert teams will be needed for technology integration (von der Gathen et al. 2024). G&A costs will rise, especially during the initial roll-out phase, with an estimated increase of 4%. Over time, despite constant human monitoring of the systems by technology teams, adidas' advanced technological expertise is projected to result in a 0.5% faster annual cost reduction compared to PUMA. In the long term, simple activities can also be replaced by AI leading to savings in personnel costs (Morel 2023).

Furthermore, the implementation of new technologies, particularly in the sporting goods

industry, can help companies reduce the risk of overstocking and stock-outs through better demand forecasting and inventory management. Both adidas and PUMA are focused on optimizing working capital, making this advantage especially relevant as AI continues to grow. Both companies have already started investing in the digitalization of their warehouse infrastructure to optimize inventory operations. With continuous improvements from 2025 onwards, inventory optimization may lead to an AHP reduction below the industry average by 2030, with a reduction of ten days for adidas and five days for PUMA. Adidas gains a greater advantage due to its more comprehensive warehouse system. Favorable inventory management will also impact production and slightly lower COGS, while also reducing the number of returns and generating efficiencies, especially in waste management. From 2025 to 2030, these potentials can be further exploited, starting with a COGS reduction of 1% for adidas and 0.5% for PUMA and thus leading to a steady margin improvement for both.

Ultimately, the successful implementation of AI technologies and long-term planning in the growing e-commerce and other business areas can increase the profitability and efficiency of adidas and PUMA and thus offset high initial costs. In terms of operational efficiency, adidas' EBIT margins are expected to improve steadily in the long term, with a change compared to the base case of -0.6 percentage points in 2025 to 2.4 percentage points in 2030. This aligns with adidas' ability to leverage technological advancements to enhance sales growth and supply chain efficiency. PUMA's EBIT margins are forecast to improve at a slower pace, ranging from -0.1 percentage points in 2025 to 1.7 percentage points in 2030. The slower shift to digital sales helps to protect its margins in the short term. While both companies are benefiting from similar technological trends, the difference in their speed of improvement is mainly driven by the time lag in PUMA's technological roll-out. Adidas' more aggressive technological implementation allows it to capture greater efficiency gains and thus results in higher EBIT margins, outpacing PUMA in this regard.

In the cash flow-based valuation, the impact of this scenario positively affects the estimated fair share prices of adidas and PUMA compared to the base case, with the effect being more pronounced for adidas. Despite the growing AI trend, adidas' stock remains overvalued by 11.4%, even as it reflects a 46.5% improvement from the base case. For PUMA, the impact is more moderate due to its less developed technological infrastructure at present, leading to higher investments and lower leverage. Nevertheless, its share price is expected to improve by 14.9% compared to the base scenario, indicating a potential undervaluation of 52.6%. While adidas gains greater benefits from AI integration, PUMA offers investors a more attractive opportunity in the event of a greater AI evolution in business. This scenario is most likely to occur in the future given the rapid advancements of AI technologies, growing consumer preference for online shopping, and businesses' increasing reliance on data-driven solutions to enhance efficiency and personalization in a digitally driven economy.

Key Findings of Scenario Analysis

In conclusion, the positioning of adidas and PUMA across the three scenarios is shaped by recent macroeconomic events like Trump's presidential re-election, and megatrends such as sustainability and technological development. Their outcomes are heavily influenced by their strong correlation in revenue growth and EBIT margin. Although the overall impacts on sales and costs are similar, key differences arise from each company's regional presence, sourcing strategies, sustainability efforts, and innovation initiatives. Adidas shows greater resilience in navigating political headwinds, benefits from its fast adoption of sustainability initiatives in an anti-ESG scenario and capitalizes on its technological advancements. Conversely, PUMA's proactive commitment to sustainability and recent digital transformation position it strongly for future success, despite short-term challenges. Ultimately, the valuation result – overvaluation of adidas and undervaluation of PUMA – remains unchanged.

Recommendation of an Investment Strategy for adidas and PUMA pairs trade

The recommendation for a fundamental pairs trade strategy involving adidas and PUMA is based on the comprehensive analysis of their strategic approach, financial performance, and response to current economic and industry trends. This includes evaluating their forecasts, competitive positioning, and valuation resilience under various potential future scenarios.

Both adidas and PUMA demonstrate strong growth prospects, with each company capitalizing on market trends within the challenging macro- and microeconomic environment. Both brands' strategies have been shaped by a growing fitness culture, the increasing demand for female and athleisure wear, running products, and the incorporation of sustainable materials, with each emphasizing certain differentiations that appeal to their customer demographics. Adidas benefits from a strong market position, supported by high brand loyalty and a stable customer base that has grown over time. A key advantage is its broad product portfolio, enabling it to appeal to a diverse demographic, including older consumers who seek quality, comfort, and premium offerings. This positions adidas uniquely to capture the growing demand from an aging population. Additionally, adidas excels in advanced sports technology and smart clothing initiatives, capitalizing on the trend of tech integration. Its well-established e-commerce strategy and balanced distribution mix further enhance its adaptability in the industry's digital transformation. However, adidas' heavy reliance on footwear makes it vulnerable to shifts in demand within this segment. While its dominance in Europe and Greater China drives global reach, the slower growth potential in Emerging Markets and intense competition from local players in North America and Asia-Pacific constrains expansion. Moreover, its diversified sourcing strategy, while reducing risk exposure, comes at the cost of slightly higher operational complexity compared to its peers. PUMA, in contrast, has exhibited agility and alignment with youth-driven fashion and cultural trends, particularly in North America, where PUMA has captured significant revenue growth. PUMA has effectively leveraged post-pandemic trends,

focusing on running shoes and strategic collaborations, enhancing its brand appeal. Its diversified revenue streams, including a larger share from accessories, provide additional growth opportunities by attracting new consumers through trendy, affordable products that serve as accessible entry points to the brand. PUMA's smaller footprint in Greater China presents untapped growth potential. Its lack of deep market penetration suggests room for expansion through localized campaigns and stronger engagement with athleisure and streetwear trends among Chinese consumers. While its concentrated reliance on Asia for sourcing exposes its supply chain to geopolitical risks, this focus enables significant cost efficiencies, supporting margin sustainability. Both brands' sustainability efforts resonate to eco-conscious consumers while the growing athleisure trend and Emerging Markets expansion, particularly in Latin America, present opportunities. Adidas offers stability and established recognition, but its growth appears more mature. PUMA presents higher growth potential, especially for investors willing to accept slightly higher risks to capitalize on its undervalued market position and brand momentum.

Additionally, adidas and PUMA show distinct financial performance trends that are relevant for the investment strategy. While adidas remains significantly larger than PUMA in terms of revenue, it has shown greater volatility in profitability. The loss in 2023 was mainly a one-time write-off. Since then, adidas has rebounded, driven by strong demand for specific footwear products, signaling a recovery and improved outlook. PUMA has achieved stable profitability, proving resilience in a competitive market as well as effective, above-average cash flow management, allowing the company to maintain a robust operating framework. Although both companies have increased their reliance on debt, PUMA has maintained a more prudent approach to leverage, reflecting its healthier capital structure. Given PUMA's consistent performance, efficient asset management, and stronger liquidity position, it represents a more attractive investment option, potentially offering higher and more stable returns.

A comparison of adidas and PUMA valuations using both enterprise DCF and multiples shows that the relative valuation leads to more extreme results. While the cash flow-based method estimates adidas' share price to be overvalued by 39.5%, the relative valuation indicates an even greater downside of 52.6%. For PUMA, the relative valuation indicates a larger upside of 38.6% compared to the current price, exceeding the cash flow-based projection by 5.8 percentage points. Nevertheless, both valuation methods provide the same conclusions. Adidas appears significantly overvalued, with its current market price of EUR 223 exceeding the average fair value of EUR 120.37 by 46.0%. Sensitivity analysis suggests limited upside potential but a downside risk of up to 53.1%. PUMA's fair price averages EUR 58.19, an upside potential of 35.7% with potential ranging from -0.4% to 101.6%, highlighting a significant upside potential. This suggests that the share price could be corrected to a more realistic value in the near future if market sentiment or investor confidence increases.

The base case valuation demonstrates the investment strategy's resilience across future scenarios. US tariff policy shifts, which are likely to occur due to Trump's strong conviction in his revised policy, could impact PUMA more than adidas, which is better positioned to navigate political changes. However, despite this potential development, PUMA's stock remains undervalued and continues to offer upside potential for investors. PUMA's stronger sustainability focus offers a strategic advantage in a high-ESG scenario, while adidas' cost flexibility provides a temporary edge in a scenario where sustainability holds less importance. However, due to the strong demand for sustainability from many stakeholders such as investors and consumers, it is likely that this megatrend will continue and even intensify, while anti-ESG movements will take place regionally and are unlikely to reach a global scale. Additionally, adidas can benefit from potentially far-reaching advancements in AI and e-commerce, driven by its more mature implementation of advanced technologies, still signaling a slight overvaluation. For PUMA, this future case also offers opportunities, which the company is

increasingly addressing through various technological initiatives. Overall, the scenario analysis underscores PUMA as an appealing long-term opportunity for investors, consistently undervalued across scenarios, whereas adidas continues to trade at an inflated level.

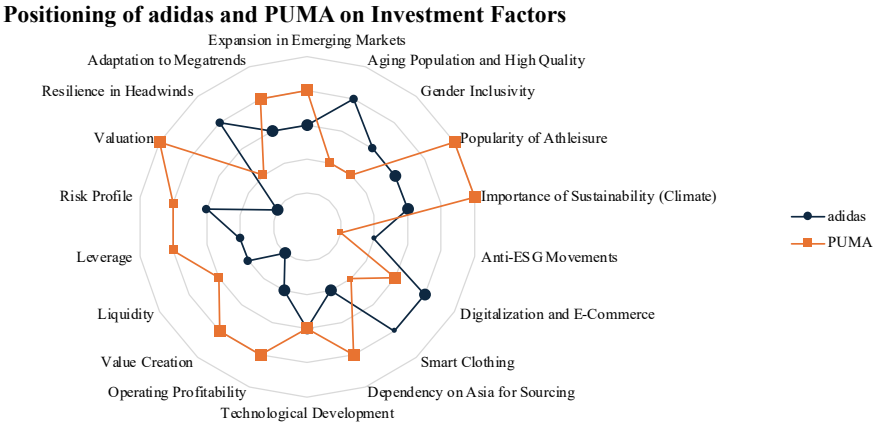

Figure 6: Positioning of adidas and PUMA on Investment Factors

Combining the current positioning of adidas and PUMA with the importance of each factor to global investors, it is clear that PUMA outperforms its direct competitor adidas in key business areas such as expansion in Emerging Markets, popularity of athleisure and importance of sustainability, particularly on environmental matters (Figure 6). This signals growth potential for investors as opportunities are exploited. In terms of digital transformation and supply chain diversification, PUMA is somewhat lagging behind, although it has already begun implementing these trends and is well-positioned to overcome this delay. Financially, PUMA has secured an outstanding position with its consistently strong operating profitability and effective financial management. This forms a solid basis for valuation, which, together with a lower risk profile, leads to a clear undervaluation, while adidas remains significantly overvalued. Additionally, PUMA demonstrates resilience in responding to intensifying megatrends. Thus, based on the comprehensive fundamental pairs trade analysis, the investment strategy of going long on PUMA and short on adidas presents a promising opportunity for investors. By betting on PUMA's potential to outperform and adidas' likelihood of underperformance, the portfolio aims to capitalize on PUMA's strengths while hedging against

potential declines in adidas' share price due to financial challenges.

Risk Management

For effective risk management, historical performance is analyzed using the past seven years of adidas' and PUMA's share prices and multiples. This period reflects recent market dynamics, including economic cycles, industry trends, inflationary periods, and customer sentiment, while minimizing distortions from outlier events, such as the COVID-19 pandemic.

Historic Stock Development and Weights of the Long-Short Portfolio

During the reviewed period, PUMA achieved an average annual return of 9.4%, slightly outperforming adidas' 8.6% return, signaling increased investor confidence in PUMA's stock (Table 22). However, PUMA carried a higher risk, with a volatility of 34.5%, compared to adidas' 30.4%, reflecting PUMA's potentially greater returns with increased risk. Historically, risk-seeking investors may have favored PUMA, while risk-averse investors leaned toward adidas. Yet, the fundamental pairs trade analysis indicates that PUMA's returns are projected to increase with potentially lower volatility relative to adidas in the future. A zero-cost portfolio with a 100% long position in PUMA and a 100% short position in adidas is selected to focus on relative performance without the influence of general market trends. This approach provides a relative annual gain of 0.8% over this period, without requiring additional capital, and reduces risk to 29.7% by largely neutralizing systematic risk and focusing on the idiosyncratic risk specific to each stock (Table 23). However, the portfolio's risk exhibits moderate volatility over time, peaking at 45.6% in the first year, falling to 16.2% by mid-2022 and rebounding thereafter (Figure 10). Nonetheless, the portfolio metrics demonstrate an effective pairs trading strategy based on fundamental analysis. From 2020 to 2021, cumulative excess portfolio returns increased due to PUMA's outperformance, peaking at the end of 2021. However, from 2022 onwards, macroeconomic challenges affected PUMA's performance and led to cumulative portfolio losses (adidas 2023). In contrast, market performance remained stable, highlighting

the portfolio's exposure to unique risk factors (Figure 11).

Fama-French Five-Factor Model

According to the Fama-French (FF) model, the portfolio returns can be predicted based on its sensitivity to macroeconomic risk factors. Developed market factors are selected for this analysis because the proposed investment is intended for international investors who primarily operate in well-established and highly developed stock markets. These factors are the most relevant and representative of the investment environment in which the investors participate. For this long-short portfolio, the five-factor model was applied using the FF factors market risk premium (Mkt-RF), small-minus-big (SMB), high-minus-low (HML), robust-minus-weak (RMW), and conservative-minus-aggressive (CMA) (French 2024). With an R-squared of 9.3%, the model explains a limited part of the portfolio's returns, suggesting other factors may drive performance. The F-statistic of 1.59 and p-value of 0.1727 indicate that the model is not statistically significant, suggesting it does not robustly explain returns. The portfolio's annualized alpha of 3.2% represents the excess return earned with the long-short portfolio. However, the intercept lacks statistical significance, potentially indicating limited impact on returns. Among the five factors, the Mkt-RF has a coefficient of -0.4164, indicating that the portfolio may have a defensive characteristic, potentially performing better during market downturns. However, with a p-value of 0.0667, this factor is not statistically significant, thus no confident conclusion can be drawn that the portfolio consistently benefits from market declines. The HML factor, with a coefficient of 1.0174, reflects a potential tilt toward value stocks, which aligns with PUMA's recent financial performance. Similarly, the SMB factor of 1.0436 and the RMW factor of 1.2925 suggest a slight tendency toward small-cap and profitable companies, respectively. These factors are consistent with PUMA's characteristics as a relatively smaller, profitable company within the industry. However, the p-values for HML, SMB, and RMW indicate that none of these factors are statistically significant. Therefore, while

these coefficients align with PUMA's profile, the lack of significance indicates that these characteristics do not drive portfolio returns with confidence. The only statistically significant factor at a 5% level is CMA, with a coefficient of -1.7938. This loading suggests a strong preference for companies with aggressive investment strategies, aligning with PUMA's growth-oriented initiatives.

In summary, while the model shows certain alignment with characteristics such as value, small-cap, and profitability, the statistical insignificance of these factors prevents final conclusions from being drawn about their influence on portfolio performance. Only the CMA factor demonstrates statistical significance, indicating a preference for growth-oriented, aggressive investments. The model's overall low explanatory power suggests that factors beyond the FF five may be influencing returns.

Performance of Current Multiples and Historical Signal-Based Long-Short Strategy

The analysis of the current multiples as of June 2024, along with a historical trend, provides further insights into the suggested pairs trade strategy. As of June 2024, the trading multiples for both companies show notable shifts. Adidas' EV/EBIT multiple has decreased from 201.7x in 2023 to 60.1x, based on trailing twelve months data, suggesting improved profitability. Despite this reduction, adidas' multiple remains substantially higher than PUMA's, which recorded an EV/EBIT multiple of 11.2x in June 2024, indicating a continued overvaluation of adidas. PUMA's multiple has remained stable, suggesting consistent operational performance. Similarly, adidas' P/E ratio has decreased by more than two-thirds, despite an improvement in net income. This implies that investors continue to price adidas optimistically relative to its earnings. In contrast, PUMA's ratio remained constant. Moreover, while adidas' EV/Revenue fell to 1.86x by mid-2024, it still commands a premium over PUMA's 0.82x, reinforcing the conclusion that PUMA is relatively undervalued. Despite a reduction in the average multiple gaps by 75.8%, a divergence of 29.9x persists. Therefore, the current multiples support the

recommended pairs trade strategy, offering the opportunity for abnormal returns through this long-short strategy.

To further support the strategy, a signal-based trading framework is developed using the historical multiples EV/EBIT and EV/Revenue of adidas and PUMA over the last seven years. Based on the relative positions and a sigma threshold of 0.5, which represents a conservative approach that reduces the risk of extreme volatility, a signal strategy with a 3-month rolling period is created. This approach generates trade signals of +1 indicating a recommendation to buy PUMA, while selling adidas, and -1, suggesting the opposite. These signals are derived by combining EV/EBIT and EV/Revenue, as investors typically assess both metrics for a holistic view. EV/EBIT reflects efficiency and profitability, while EV/Revenue highlights top-line valuation relative to enterprise value, providing complementary insights into financial and operational performance. This signal-based strategy reflects proactive investor behavior, leveraging the overvaluation of one company's ratios by selling its stock while capitalizing on the undervaluation of the other by buying its shares. By integrating this rebalancing approach into the portfolio, the strategy aligns with the broader recommendation of exploiting valuation discrepancies for consistent returns. Over the past seven years, the signal trading strategy delivered an average monthly return of 1.5%, with a standard error of 0.007, indicating a high precision in the average return estimate. The corresponding t-test provides statistically significant evidence against the null hypothesis at the 5% level, with the p-value of 0.0263. This suggests that the observed positive returns are unlikely to be due to chance. These results provide evidence that a long-short strategy of adidas and PUMA generates positive returns. Breaking down the strategy by signal, the average return for the signal recommending the long-short strategy is 2.9%, while the return for the opposite signal is significantly lower at 1.5%. The historical results show that the recommended long PUMA and short adidas strategy has

been more profitable, reinforcing the recommendation to pursue this approach based on relative performance insights.

Key Findings of Risk Management

The risk analysis shows that a portfolio with a 100% long position in PUMA and a 100% short position in adidas effectively reduces systematic risk, being primarily defined by idiosyncratic risk factors, resulting in an annualized relative return of 0.8%. While PUMA has historically delivered higher returns, it is associated with greater volatility due to its growth-oriented nature. Despite moderate fluctuations in overall portfolio risk, the strategy demonstrates a robust approach to mitigating market impact, with a focus on the relative performance of the two stocks. Both historical and current valuation multiples support this strategy, highlighting consistent profitability due to the undervaluation of PUMA and the overvaluation of adidas.

Conclusion

Overall, the recommended pairs trade strategy of going long on PUMA and short on adidas remains promising, as PUMA is likely to maintain its competitive edge, while adidas may continue to be overvalued. PUMA's attractive valuation, coupled with its steady financial performance and growth potential in Emerging Markets, offers a promising opportunity for investors willing to embrace slightly higher risk. The company's agility, strong brand appeal in key markets, along with its alignment with current consumer trends in athleisure and sustainability, position it well for future growth. The undervaluation, highlighted by both cash flow-based and relative valuation methods, further strengthens the case for a long position in PUMA, with substantial upside potential. On the other hand, adidas, despite its established market position and strong brand loyalty, faces significant challenges, including overvaluation based on current market conditions. The company's volatility and substantial debt exposure present risks that are not fully priced into its stock. While adidas benefits from its leadership in

markets such as Europe and Greater China, an established e-commerce presence, and resilience to macroeconomic headwinds, its growth prospects are constrained by slower adaptation to opportunities in Emerging Markets, comparatively lower investment in emissions reduction initiatives, and weaker capitalization on the growing athleisure trend. The downside risk is notably higher for adidas, making it less attractive at its current valuation.

Considering risk management, the strategy remains compelling and demonstrates significant potential for outperformance. The portfolio has successfully mitigated systematic market risk, as evidenced by a reduction in portfolio volatility over time, while maintaining exposure to the idiosyncratic risks of each stock. While the FF model provided some insights, particularly regarding the portfolio's preference for growth-oriented companies, its limited explanatory power suggests that other factors may be affecting returns. The signal-based trading framework has generated larger abnormal returns for a long position in PUMA and a short position in adidas, further supporting the viability of this approach. The concept of pairs trade aims to construct a market-neutral portfolio by offsetting positions, thereby mitigating systematic risk and minimizing the portfolio's sensitivity to broader market fluctuations. This strategy centers on capitalizing on the relative performance of two stocks, leveraging their strong correlation within the sportswear sector to enhance potential returns. Since this strategy is inherently concentrated within a single industry and lacks diversification, international investors should incorporate it into a broader, more diversified portfolio. By combining the potential of this long-short pairs trade strategy with exposure to unrelated industries, investors can mitigate industry-specific risks and enhance the overall risk-return profile of their investments.

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Appendix

Glossary

AHP	Average Holding Period
AI	Artificial Intelligence
CAGR	Compound Annual Growth Rate
CAPEX	Capital Expenditure
CAPM	Capital Asset Pricing Model
CMA	Conservative-Minus-Aggressive
COGS	Costs Of Goods Sold
D/E	Debt-to-Equity
D/EV	Debt-to-Enterprise Value
DCF	Discounted Cash Flow
EBIT	Earnings Before Interests and Taxes
ESG	Environmental, Social and Governance
EUR	Euro
EV/EBIT	Enterprise Value-to-EBIT
EV/Revenue	Enterprise Value-to-Revenue
FF	Fama-French
G&A	General and Administrative
GDP	Gross Domestic Product
GHG	Greenhouse Gas
HML	High-Minus-Low
Mkt-Rf	Market Risk Premium
NWC	Net Working Capital
P/E	Price-to-Earnings

PPE	Property, Plant, and Equipment
R&D	Research and Development
RMW	Robust-Minus-Weak
ROE	Return On Equity
SMB	Small-Minus-Big
UFCF	Unlevered Free Cash Flow
US	United States
WACC	Weighted Average Cost of Capital

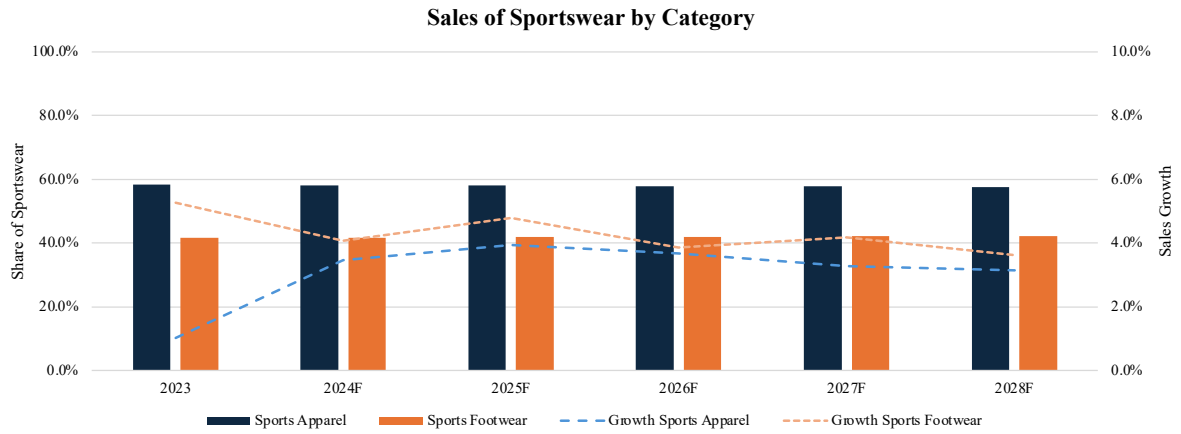

Figure 7: Sales of Sportswear by Category (Euromonitor International 2024)

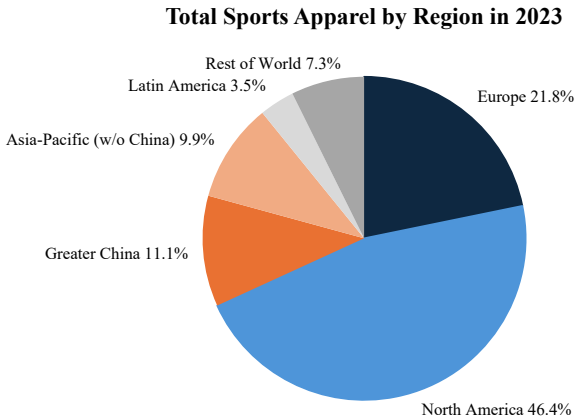

Figure 8: Total Sports Apparel by Region in 2023 (Euromonitor International 2024)

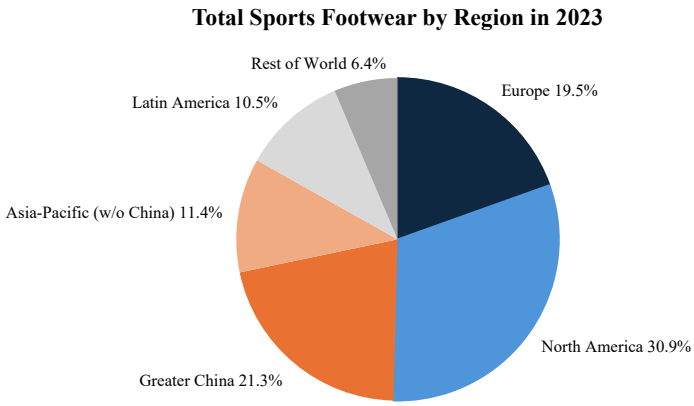

Figure 9: Total Sports Footwear by Region in 2023 (Euromonitor International 2024)

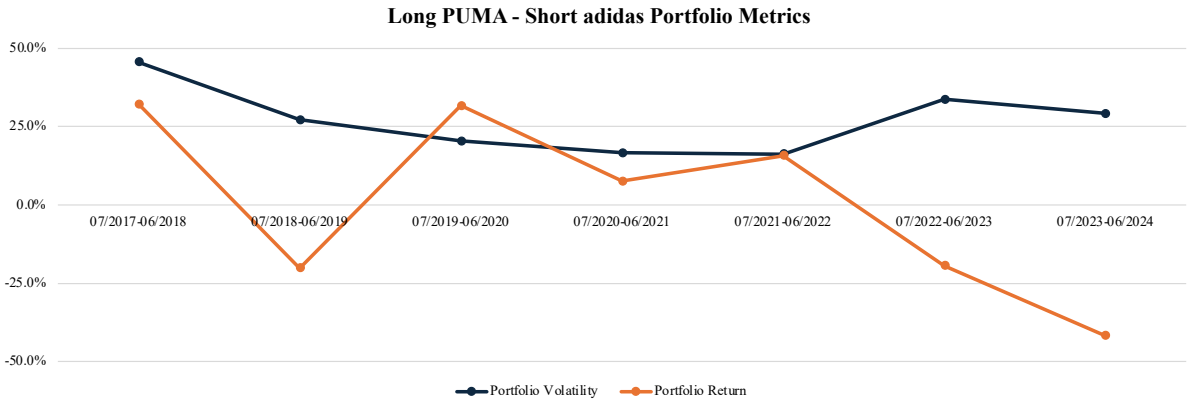

Figure 10: Long PUMA – Short adidas Portfolio Metrics

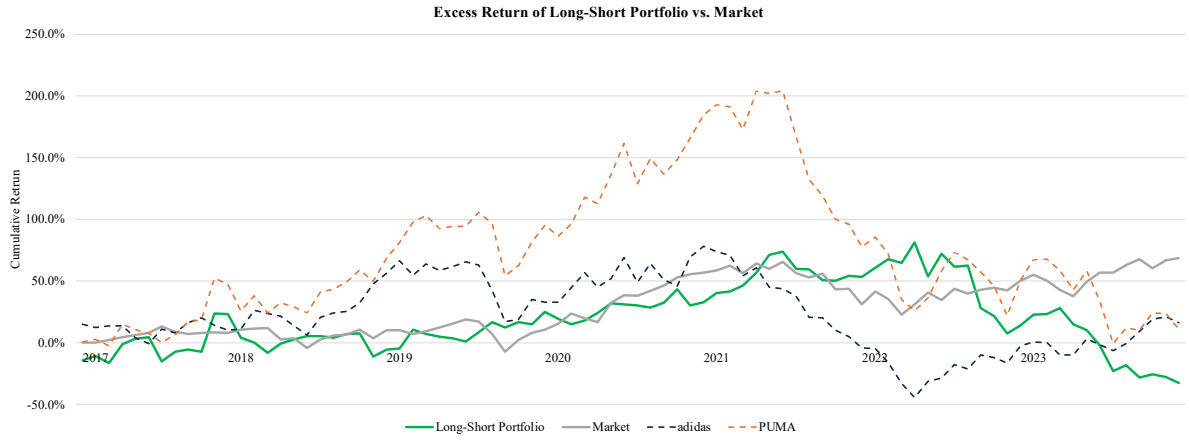

Figure 11: Excess Return of Long-Short Portfolio vs. Market

Table 1: Top 10 Companies by Sportswear Market in 2023 (Euromonitor International 2024)

Ranking	World	Europe	North America	China
1	18.0% Nike Inc	16.7% Nike Inc	18.1% Nike Inc	23.8% Nike Inc
2	8.3% adidas Group	11.7% adidas Group	4.9% adidas Group	19.0% Anta (China) Co Ltd
3	3.4% VF Corp	5.4% Decathlon SA	4.5% lululemon athletica inc	9.7% adidas Group
4	3.1% Anta (China) Co Ltd	3.9% Puma SE	4.3% VF Corp	9.3% Li Ning Co Ltd
5	2.6% Puma SE	3.4% VF Corp	3.4% Under Armour Inc	5.7% Skechers USA Inc
6	2.4% Skechers USA Inc	1.8% Asics Corp	2.5% Skechers USA Inc	5.5% Xtep International Holdings Ltd
7	2.2% lululemon athletica inc	1.2% Under Armour Inc	2.0% Puma SE	3.0% 361 Degrees International Ltd
8	2.1% Under Armour Inc	1.0% Authentic Brands Group LLC	1.9% Columbia Sportswear Co	2.7% VF Corp
9	1.5% New Balance Athletic Shoe Inc	1.0% Skechers USA Inc	1.5% New Balance Athletic Shoe Inc	2.0% Qiaodan Sports Co Ltd
10	1.4% Li Ning Co Ltd	0.9% New Balance Athletic Shoe Inc	1.3% Hanesbrands Inc	1.8% New Balance Athletic Shoe Inc

Ranking	Asia-Pacific (w/o China)	Latin America	Rest of World
1	12.4% Nike Inc	17.5% Nike Inc	17.5% Nike Inc
2	8.8% adidas Group	13.7% adidas Group	8.7% adidas Group
3	3.9% VF Corp	6.0% Puma SE	1.6% Puma SE
4	2.8% F&F Co Ltd	3.0% Grupo Sforza	1.6% Asics Corp
5	2.8% Mizuno Corp	2.1% Authentic Brands Group LLC	1.2% lululemon athletica inc
6	2.8% Puma SE	2.1% Under Armour Inc	1.2% VF Corp
7	2.6% New Balance Athletic Shoe Inc	1.7% Asics Corp	0.8% Authentic Brands Group LLC
8	2.6% Asics Corp	1.7% Vulcabrás Azaléia SA	0.8% Kathmandu Holdings Ltd
9	1.6% Fila Holding SpA	1.7% Fila Holding SpA	0.4% Skechers USA Inc
10	1.6% Descente Ltd	1.7% VF Corp	0.4% Under Armour Inc

Table 2: Revenue Share in 2023 and CAGR by Category per Region (Euromonitor International 2024)

	Footwear		Apparel	
	Share in 2023	CAGR 2023-2028	Share in 2023	CAGR 2023-2028
Europe	39.0%	2.6%	61.0%	2.1%
North America	32.2%	3.5%	67.8%	3.4%
Greater China	57.9%	5.4%	42.1%	5.5%
Asia-Pacific (w/o China)	45.2%	6.4%	54.8%	5.0%
Latin America	67.9%	3.7%	32.1%	3.0%
Rest of World	38.3%	3.1%	61.7%	3.7%
World	41.6%	4.1%	58.4%	3.5%

Table 3: Revenue Share and CAGR of Athleisure by Category (Euromonitor International 2024)

in billion EUR	2023	2024F	2025F	2026F	2027F	2028F	CAGR 2023-2028
Total Athleisure	150.9	164.0	178.7	195.2	214.3	235.5	
% of Total Sportswear	41.3%	43.3%	45.3%	47.6%	50.5%	53.7%	9.3%
Footwear							
Sports-inspired Footwear	65.4	72.3	80.1	89.1	100.6	113.5	
Growth	13.0%	10.6%	10.8%	11.2%	12.9%	12.8%	11.7%
% of Total Footwear	43.0%	45.7%	48.3%	51.7%	56.1%	61.1%	
% of Total Sportswear	17.9%	19.1%	20.3%	21.7%	23.7%	25.9%	
Apparel							
Sports-inspired Apparel	85.5	91.7	98.6	106.1	113.7	122.0	
Growth	6.3%	7.3%	7.5%	7.6%	7.2%	7.3%	7.4%
% of Total Apparel	40.1%	41.6%	43.0%	44.7%	46.4%	48.2%	
% of Total Sportswear	23.4%	24.2%	25.0%	25.9%	26.8%	27.8%	

Table 4: Current Capital Structure based on Market Values

	2021	2022	2023 HY	2023 FY	2024 HY
adidas					
Market Capitalization	48,512	22,756	31,742	32,882	39,816
Shares Outstanding	191.6	178.5	178.5	178.5	178.5
Stock Price	253.2	127.5	177.8	184.2	223.0
Net Financial Debt*	2,118	5,668	5,519	4,126	4,004
EV	50,629	28,425	37,262	37,007	43,820
D/EV	4.2%	19.9%	14.8%	11.1%	9.1%
E/EV	95.8%	80.1%	85.2%	88.9%	90.9%
PUMA					
Market Capitalization	16,082	8,485	8,257	7,571	6,421
Shares Outstanding	149.6	149.6	149.8	149.9	149.8
Stock Price	107.5	56.7	55.1	50.5	42.9
Net Financial Debt*	695	933	1,378	1,007	1,333
EV	16,777	9,418	9,635	8,577	7,754
D/EV	4.1%	9.9%	14.3%	11.7%	17.2%
E/EV	95.9%	90.1%	85.7%	88.3%	82.8%

*Assumption: Book Value is the approximated Market Value.

Table 5: Weighted Average Cost of Capital

adidas		**PUMA**	
US treasury bond 10 year	4.4%	US 10 year treasury bond	4.4%
Cross currency basis swap spread USD to EUR	0.1%	Cross currency basis swap spread USD to EUR	0.1%
Risk-free rate	4.3%	Risk-free rate	4.3%
Market risk premium	5.5%	Market risk premium	5.5%
YTM of bonds issued by adidas (10-year maturity)	3.0%	Interest expense FY 2023 (million EUR)	53.1
		EBIT FY 2023 (million EUR)	621.5
		Interest coverage ratio	11.70
Credit spread	0.6%	Credit spread	0.8%
Debt beta	10.1%	Cost of debt	5.0%
Cost of debt	4.8%	Debt beta	13.6%
Corporate tax rate	27.4%	Corporate tax rate	27.2%
After-tax Cost of debt	3.5%	After-tax Cost of debt	3.6%
Systematic risk of unlevered cost of equity	93.2%	Systematic risk of unlevered cost of equity	83.1%
Old Systematic risk of levered cost of equity	101.6%	Old Systematic risk of levered cost of equity	97.6%
Equity beta (relevered)	107.9%	Equity beta (relevered)	106.3%
E/EV	85.0%	E/EV	75.0%
D/EV	15.0%	D/EV	25.0%
Cost of unlevered equity	9.4%	Cost of unlevered equity	8.8%
Cost of levered equity	10.2%	Cost of levered equity	10.1%
WACC	**9.2%**	**WACC**	**8.5%**

Table 6: Reformulated Cash Flow Statement of adidas

(in million EUR)	2021	2022	2023	2024 HY	2024 FY	2025	2026	2027	2028	2029	2030
Core Business											
Core EBIT	1,968	636	276	718	1,459	1,634	1,824	2,029	2,252	2,654	2,825
Statutory Tax	-539	-174	-76	-197	-400	-448	-500	-556	-617	-727	-774
Tax Adjustments	7	160	-61	-9	0	0	0	0	0	0	0
Core NOPLAT	1,436	622	139	512	1,059	1,186	1,324	1,473	1,635	1,927	2,051
Cash Adjustments:											
Depreciation, amortization and impairment losses	1,149	1,375	1,212	560	976	1,009	1,045	1,083	1,123	1,166	1,212
Change in NWC	242	-2,079	1,271	405	260	-122	21	33	45	87	182
Change in PP&E	-1,388	-1,493	-674	-1,051	-582	-1,091	-1,176	-1,257	-1,336	-1,416	-1,495
Change in Goodwill	-20	-32	22	-6	-2	-23	-25	-27	-28	-30	-32
Investments in other intangible assets	650	-77	-13	2	-31	-89	-85	-81	-80	-79	-80
Change in other operating net assets	-53	2	34	58	-110	-71	-70	-72	-76	-72	-79
Total Cash Adjustments	580	-2,304	1,852	-31	512	-387	-289	-322	-353	-344	-292
Core Unlevered Free Cash Flow	2,016	-1,682	1,991	481	1,571	799	1,035	1,151	1,282	1,583	1,760
Non-Core Business											
Non-Core EBIT	17	21	-12	-36	-66	-78	-86	-92	-99	-106	-133
Statutory Tax	-5	-6	3	10	18	21	24	25	27	29	36
Tax Adjustments	141	-188	-46	-7	0	0	0	0	0	0	0
Gains / (losses) from discontinued operations, net of tax	666	384	44	-7	-7	0	0	0	0	0	0
Non-Core NOPLAT	819	212	-10	-40	-55	-57	-63	-67	-72	-77	-97
Cash Adjustments:											
Change in Other Non-Core Assets	-1,970	2,024	-35	-7	0	0	0	0	0	0	0
Change in Other Non-Core Liabilities	577	-743	136	-26	35	-93	5	5	5	5	5
Other comprehensive income	572	18	-238	192	192	0	0	0	0	0	0
Total Cash Adjustments	-821	1,299	-137	159	227	-93	5	5	5	5	5
Non-Core Unlevered Free Cash Flow	-1.662	1,511	-147	119	172	-150	-58	-62	-67	-72	-92
Total Unlevered Free Cash Flow	2,014	-171	1,844	600	1,743	649	978	1,089	1,215	1,511	1,668
Financing Business											
Net financial cost	-131	-269	-201	-131	-268	-290	-281	-289	-301	-313	-324
Tax Shield	36	74	55	36	74	79	77	79	83	86	89
Change in Net Debt	-253	3,551	-1,543	-55	210	216	267	259	263	242	235
Net Change in Equity	-1,666	-3,184	-155	-450	-1,758	-655	-1,041	-1,138	-1,259	-1,525	-1,668
Total	-2,014	171	-1,844	-600	-1,743	-649	-978	-1,089	-1,215	-1,511	-1,668

Table 7: Reformulated Cash Flow Statement of PUMA

(in million EUR)	2021	2022	2023 FY	2024 HY	2024 FY	2025	2026	2027	2028	2029	2030
Core Business											
Core EBIT	533	607	583	265	533	601	673	750	775	800	1,255
Statutory Tax	-145	-165	-159	-72	-145	-164	-183	-204	-211	-218	-342
Tax Adjustments	9	17	22	9	0	0	0	0	0	0	0
Core NOPLAT	397	459	446	202	388	438	490	546	564	582	913
Cash Adjustments:											
Depreciation and impairment	306	359	358	184	404	446	486	526	566	605	644
Change in NWC	-282	-408	-11	160	274	-33	-23	-17	-17	-13	6
Change in PP&E	-434	-649	-427	-194	-595	-661	-696	-732	-769	-804	-842
Investments in intangible assets	-28	-35	-24	-10	5	-21	-21	-20	-20	-21	-21
Change in other operating net assets	-24	239	-11	-1	12	3	3	3	1	0	-1
Total Cash Adjustments	-462	-494	-116	138	100	-267	-251	-240	-239	-233	-213
Core Unlevered Free Cash Flow	-65	-35	330	340	487	171	239	306	326	349	700
Non-Core Business											
Non-Core EBIT	23	33	38	11	38	37	37	37	37	37	37
Statutory Tax	-6	-9	-10	-3	-10	-10	-10	-10	-10	-10	-10
Tax Adjustments	0	5	-10	-4	0	0	0	0	0	0	0
Non-Core NOPLAT	17	30	18	4	27	27	27	27	27	27	27
Cash Adjustments:											
Change in Other Non-Core Assets	-2	4	-16	-1	10	-1	-1	-1	-1	-1	0
Change in Other Non-Core Liabilities	4	-5	-23	-1	50	9	9	9	9	9	10
Other comprehensive income	207	8	-107	91	91	0	0	0	0	0	0
Total Cash Adjustments	210	7	-147	90	152	8	7	7	8	8	10
Non-Core Unlevered Free Cash Flow	226	36	-129	94	179	35	35	34	35	35	37
Total Unlevered Free Cash Flow	162	1	201	434	666	206	274	340	360	384	737
Financing Business											
Net financial cost	-51	-88	-143	-69	-166	-172	-161	-149	-138	-128	-135
Tax Shield	14	24	39	19	45	47	44	41	38	35	37
Change in Net Debt	-31	237	74	-26	1,475	159	195	195	206	218	149
Net Change in Equity	-93	-174	-171	-357	-2,020	-239	-352	-426	-466	-509	-787
Total	-162	-1	-201	-434	-666	-206	-274	-340	-360	-384	-737

Table 8: Enterprise Discounted Cash Flow Model of adidas

(in million EUR, except per share data)	HY	FY						Terminal value	
	30.06.24	2024	2025	2026	2027	2028	2029	2030	2031
Core Unlevered FCF		1,571	799	1,035	1,151	1,282	1,583	1,760	1,836
Core Enterprise Value	28,224	27,923	29,688	31,378	33,106	34,863	36,480	38,070	
Non-Core Unlevered FCF	119	172	-150	-58	-62	-67	-72	-92	
Total Enterprise Value	**28,343**	**28,095**	**29,538**	**31,320**	**33,044**	**34,796**	**36,408**	**37,978**	
Net Debt	4,251								
Equity available to Common Shareholders (30.06.2024)	24,091								
Share Price	**134.93**								
Current Share Price (30.06.2024)	223.00								
Overvaluation	-39.5%								

Table 9: Enterprise Discounted Cash Flow Model of PUMA

(in million EUR, except per share data)	HY	FY						Terminal value	
	30.06.24	2024	2025	2026	2027	2028	2029	2030	2031
Core Unlevered FCF		487	171	239	306	326	349	700	727
Core Enterprise Value	11,238	11,219	11,999	12,778	13,556	14,380	15,251	15,844	
Non-Core Unlevered FCF	94	179	35	35	34	35	35	37	
Total Enterprise Value	**11,332**	**11,398**	**12,034**	**12,812**	**13,590**	**14,415**	**15,286**	**15,881**	
Net Debt	2,833								
Equity available to Common Shareholders (30.06.2024)	8,499								
Share Price	**56.95**								
Current Share Price (30.06.2024)	42.87								
Overvaluation	32.8%								

Table 10: Sensitivity Analysis of adidas on Share Price

		WACC								
		8.4%	8.6%	8.8%	9.0%	**9.2%**	9.4%	9.6%	9.8%	10.0%
Long term growth rate	3.6%	139.92	134.26	129.03	124.18	119.69	115.50	111.60	107.95	104.52
	3.8%	144.75	138.65	133.05	127.87	123.08	118.63	114.49	110.62	107.01
	4.0%	150.01	143.43	137.40	131.85	126.72	121.98	117.58	113.48	109.66
	4.2%	155.77	148.64	142.13	136.16	130.66	125.59	120.90	116.54	112.49
	4.4%	162.11	154.34	147.28	140.84	**134.93**	129.49	124.48	119.83	115.52
	4.6%	169.10	160.61	152.93	145.94	139.56	133.72	128.34	123.37	118.77
	4.8%	176.87	167.54	159.13	151.53	144.62	138.30	132.52	127.19	122.28
	5.0%	185.55	175.23	165.99	157.67	150.15	143.31	137.06	131.33	126.06
	5.2%	195.30	183.82	173.60	164.46	156.23	148.78	142.01	135.83	130.16

Table 11: Sensitivity Analysis of PUMA on Share Price

		WACC								
		7.7%	7.9%	8.1%	8.3%	**8.5%**	8.7%	8.9%	9.1%	9.3%
Long term growth rate	3.1%	59.14	56.47	54.03	51.77	49.68	47.75	45.95	44.27	42.71
	3.3%	61.46	58.58	55.94	53.52	51.29	49.23	47.31	45.53	43.87
	3.5%	64.01	60.88	58.03	55.42	53.03	50.82	48.77	46.88	45.12
	3.7%	66.81	63.40	60.31	57.49	54.91	52.53	50.35	48.33	46.45
	3.9%	69.90	66.17	62.80	59.74	**56.95**	54.40	52.05	49.89	47.89
	4.1%	73.34	69.23	65.54	62.21	59.18	56.42	53.89	51.57	49.43
	4.3%	77.19	72.64	68.58	64.92	61.62	58.63	55.90	53.39	51.10
	4.5%	81.52	76.45	71.95	67.93	64.31	61.05	58.08	55.38	52.90
	4.7%	86.42	80.73	75.72	71.26	67.28	63.71	60.48	57.54	54.86

Table 12: Multiples Valuation of adidas

Trading multiples	EV/EBIT	EV/Revenue	P/E
Nike	16.4x	2.0x	20.3x
Under Armour	-41.4x	0.5x	-33.8x
Lululemon	16.0x	3.7x	23.1x
ASICS	22.8x	2.9x	32.7x
V.F Corporation	-57.6x	1.2x	-4.5x
Skechers	12.3x	1.2x	17.6x
Anta	13.0x	3.4x	13.3x
Li Ning	7.4x	1.2x	78.0x
Puma	12.9x	1.0x	24.6x
adidas	**201.7x**	**2.1x**	**204.6x**

	EV/EBIT	EV/Revenue	P/E
Mean	14.4x	2.2x	29.9x
Median	13.0x	2.0x	23.1x

FY 2023	EV/EBIT	EV/Revenue	P/E
Implied Enterprise Value	2,930	43,110	
(-) Net Debt	439	6,467	
Implied Equity Value	2,490	36,644	
# of Shares Outstanding	178.55	178.55	
Implied Share Price	**13.95**	**205.23**	**25.22**
Median of Share Price	**25.22**		
Potential	-88.7%		

Forecasted FY 2024	EV/EBIT	EV/Revenue	P/E
Implied Enterprise Value	18,150	46,128	
(-) Net Debt	2,723	6,919	
Implied Equity Value	15,428	39,209	
# of Shares Outstanding	178.55	178.55	
Implied Share Price	**86.41**	**219.60**	**105.80**
Median of Share Price	**105.80**		
Potential	-52.6%		

Worst Case

	EV/EBIT	EV/Revenue	P/E
Mean	13.0x	2.0x	26.9x
Median	11.7x	1.8x	20.8x

FY 2023	EV/EBIT	EV/Revenue	P/E
Implied Enterprise Value	2,637	38,799	
(-) Net Debt	396	5,820	
Implied Equity Value	2,241	32,979	
# of Shares Outstanding	178.55	178.55	
Implied Share Price	**12.55**	**184.71**	**22.70**
Median of Share Price	**22.70**		
Potential	-89.8%		

Forecasted FY 2024	EV/EBIT	EV/Revenue	P/E
Implied Enterprise Value	16,335	41,515	
(-) Net Debt	2,450	6,227	
Implied Equity Value	13,885	35,288	
# of Shares Outstanding	178.55	178.55	
Implied Share Price	**77.77**	**197.64**	**95.22**
Median of Share Price	**95.22**		
Potential	-57.3%		

Best Case

	EV/EBIT	EV/Revenue	P/E
Mean	15.8x	2.4x	32.9x
Median	14.3x	2.2x	25.4x

FY 2023	EV/EBIT	EV/Revenue	P/E
Implied Enterprise Value	3,223	47,421	
(-) Net Debt	483	7,113	
Implied Equity Value	2,739	40,308	
# of Shares Outstanding	178.55	178.55	
Implied Share Price	**15.34**	**225.75**	**27.74**
Median of Share Price	**27.74**		
Potential	-87.6%		

Forecasted FY 2024	EV/EBIT	EV/Revenue	P/E
Implied Enterprise Value	19,965	50,741	
(-) Net Debt	2,995	7,611	
Implied Equity Value	16,970	43,130	
# of Shares Outstanding	178.55	178.55	
Implied Share Price	**95.05**	**241.56**	**116.38**
Median of Share Price	**116.38**		
Potential	-47.8%		

Table 13: Multiples Valuation of PUMA

Trading multiples	EV/EBIT	EV/Revenue	P/E
Nike	16.4x	2.0x	20.3x
Under Armour	-41.4x	0.5x	-33.8x
Lululemon	16.0x	3.7x	23.1x
ASICS	22.8x	2.9x	32.7x
V.F Corporation	-57.6x	1.2x	-4.5x
Skechers	12.3x	1.2x	17.6x
Anta	13.0x	3.4x	13.3x
Li Ning	7.4x	1.2x	78.0x
adidas	201.7x	2.1x	204.6x
Puma	**12.9x**	**1.0x**	**24.6x**

	EV/EBIT	EV/Revenue	P/E
Mean	41.4x	2.4x	55.6x
Median	16.0x	2.1x	23.1x

FY 2023	EV/EBIT	EV/Revenue	P/E
Implied Enterprise Value	10,151	18,217	
(-) Net Debt	2,538	4,554	
Implied Equity Value	7,613	13,663	
# of Shares Outstanding	149.23	149.23	
Implied Share Price	**51.02**	**91.56**	**40.26**
Median of Share Price	**51.02**		
Potential	19.0%		

Worst Case

	EV/EBIT	EV/Revenue	P/E
Mean	37.2x	2.1x	50.1x
Median	14.4x	1.9x	20.8x

FY 2023	EV/EBIT	EV/Revenue	P/E
Implied Enterprise Value	9,136	16,396	
(-) Net Debt	2,284	4,099	
Implied Equity Value	6,852	12,297	
# of Shares Outstanding	149.23	149.23	
Implied Share Price	**45.92**	**82.40**	**36.23**
Median of Share Price	**45.92**		
Potential	7.1%		

Best Case

	EV/EBIT	EV/Revenue	P/E
Mean	45.5x	2.6x	61.2x
Median	17.5x	2.3x	25.4x

FY 2023	EV/EBIT	EV/Revenue	P/E
Implied Enterprise Value	11,166	20,039	
(-) Net Debt	2,792	5,010	
Implied Equity Value	8,375	15,029	
# of Shares Outstanding	149.23	149.23	
Implied Share Price	**56.12**	**100.71**	**44.28**
Median of Share Price	**56.12**		
Potential	30.9%		

Table 14: Projected Impact on Financials of adidas under Scenario 1

			2025	2026	2027	2028	2029	Information
Income Statement								
Revenue growth	North America	%	-13.0%	-9.0%	-5.0%	-2.0%	0.0%	Increased tariffs and reduced spendings (broader global footprint), gradual improvements due to supply chain adjustments
	Europe	%	-3.0%	-6.0%	-4.0%	-2.0%	-2.0%	Pressure from Chinese manufacturers, counteracting with European innovation
COGS growth		%	9.0%	7.0%	5.0%	2.0%	0.0%	Increased tariffs on imported goods (23% of goods produced in China), gradual decrease due to supply chain adjustments
Other operating expenses	Distribution and selling expenses	%	2.5%	2.5%	1.0%	0.5%	0.0%	Increase due to higher logistics and transportation costs as a result of new procurement locations
	General and administration expenses	%	5.0%	5.0%	2.0%	1.0%	0.0%	Related to supply chain adjustments
EBIT margin	vs. base case	%	-2.0%	-1.8%	-1.0%	-0.4%	0.0%	
Balance Sheet								
Property, Plant & Equipment	CAPEX	% of sales	1.0%	1.0%	1.0%	1.0%	0.0%	Need of additional investments for relocalization of production

Table 15: Projected Impact on Financials of PUMA under Scenario 1

			2025	2026	2027	2028	2029	Information
Income Statement								
Revenue growth	North America	%	-16.0%	-11.0%	-7.0%	-5.0%	-1.0%	Increased tariffs and reduced spendings (higher reliance on US sales), gradual improvements due to supply chain adjustments
	Europe	%	-5.0%	-8.0%	-6.0%	-4.0%	-2.0%	Pressure from Chinese manufacturers, counteracting with European innovation
COGS growth		%	9.0%	7.0%	5.0%	2.0%	0.0%	Increased tariffs on imported goods (32% of goods produced in China), gradual decrease due to supply chain adjustments
Other operating expenses	Sales and distribution expenses	%	3.0%	3.0%	1.0%	1.0%	0.0%	Increase due to higher logistics and transportation costs as a result of new procurement locations
	Administrative and general expenses	%	6.0%	6.0%	3.0%	2.0%	0.0%	Related to supply chain adjustments
EBIT margin	vs. base case	%	-2.8%	-2.5%	-1.3%	-0.7%	0.1%	
Balance Sheet								
Property, Plant & Equipment	CAPEX	% of sales	2.0%	2.0%	2.0%	1.0%	0.0%	Need of additional investments for relocalization of production

Table 16: Projected Impact on Financials of adidas under Scenario 2.1

Scenario 2.1 - Sustainability becomes more important			2017 baseline	2024	2025	2026	2027	2028	2029	2030	Terminal Value	Information
Carbon price	Weighted average direct carbon price per ton worldwide	$		62.7	102.3	141.8	181.4	220.9	260.5	300.0		Assumed the maximum price target by 2030
		€		58.6	95.5	132.5	169.4	206.4	243.3	280.2		Converted by EUR/USD rate as of 28.06.2024
Scope 1 + 2	CO2 emissions	million tons	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0		Following company's target of 90% reduction of Scope 1 and 2 on a 2017 baseline
	CO2 emissions costs	€ million		8.3	11.4	12.8	12.5	10.6	7.0	1.7		Gradual increase in Other Operating Expenses by emissions costs (reduction in emission stronger than rise in carbon price, therefore decreasing effect)
Scope 3	CO2 emissions	million tons	8.0	5.9	5.8	5.8	5.7	5.7	5.7	5.6		Following company's target of 30% reduction of Scope 3 on a 2017 baseline
	CO2 emissions costs	€ million		343.3	556.2	766.3	973.7	1,178.4	1,380.3	1,579.5		Gradual increase in COGS by emissions costs (reduction in emission weaker than rise in carbon price, therefore increasing effect)
Total scopes	Total CO2 emissions	million tons	8.1	6.0	5.9	5.9	5.8	5.8	5.7	5.6		Total target reduction of emissions by 30% on a 2017 baseline set by the company
	Total CO2 emissions costs	€ million		351.6	567.6	779.1	986.2	1,189.0	1,387.3	1,581.2		Gradual increase in costs due to higher carbon price despite lower emissions

Income Statement			2024	2025	2026	2027	2028	2029	2030		Information
Revenue growth	Share of sustainable products	%	80.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%		Following company's target of 90% from 2025 onwards
	Sustainable Footwear										Applied to all segment
	Europe	%	6.4%	6.4%	6.4%	6.4%	6.4%	6.4%	6.4%		Industry CAGR 2024 - 2030
	North America	%	6.1%	6.1%	6.1%	6.1%	6.1%	6.1%	6.1%		Industry CAGR 2024 - 2030
	Greater China	%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%		Industry CAGR 2024 - 2030
	Emerging Markets	%	4.8%	4.8%	4.8%	4.8%	4.8%	4.8%	4.8%		Industry CAGR 2024 - 2030
	Latin America	%	5.3%	5.3%	5.3%	5.3%	5.3%	5.3%	5.3%		Industry CAGR 2024 - 2030
	Japan/South Korea	%	7.1%	7.1%	7.1%	7.1%	7.1%	7.1%	7.1%		Industry CAGR 2024 - 2030
	Long-term impact vs. base case	%								0.5%	Due to lower sustainability efforts made by adidas
COGS growth		%	3.1%	4.2%	5.1%	5.8%	6.2%	6.5%	6.6%		Driven by Scope 3 emissions costs
Other operating expenses		%	0.1%	0.1%	0.1%	0.1%	0.1%	0.0%	0.0%		Driven by Scope 1 and 2 emissions costs

Table 17: Projected Impact on Financials of PUMA under Scenario 2.1

Scenario 2.1 - Sustainability becomes more important			2017 baseline	2024	2025	2026	2027	2028	2029	2030	Terminal Value	Information
Carbon price	Weighted average direct carbon price per ton worldwide	$		62.7	102.3	141.8	181.4	220.9	260.5	300.0		Assumed the maximum price target by 2030
		€		58.6	95.5	132.5	169.4	206.4	243.3	280.2		Converted by EUR/USD rate as of 28.06.2024
Scope 1 + 2	CO2 emissions	million tons	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		Following company's target of 90% reduction of Scope 1 and 2 on a 2017 baseline
	CO2 emissions costs	€ million		0.4	0.6	0.8	1.0	1.1	1.2	1.3		Gradual increase in Other Operating Expenses by emissions costs (reduction in emission weaker than rise in carbon price, therefore increasing effect)
Scope 3	CO2 emissions	million tons	1.5	1.1	1.1	1.1	1.1	1.1	1.0	1.0		Following company's target of 33% reduction of Scope 3 on a 2017 baseline
	CO2 emissions costs	€ million		63.8	103.2	142.0	180.2	217.7	254.7	291.0		Gradual increase in COGS by emissions costs (reduction in emission weaker than rise in carbon price, therefore increasing effect)
Total scopes	Total CO2 emissions	million tons	1.6	1.1	1.1	1.1	1.1	1.1	1.0	1.0		Total target reduction of emissions by 35% on a 2017 baseline set by the company
	Total CO2 emissions costs	€ million		64.2	103.8	142.8	181.1	218.9	255.9	292.3		Gradual increase in costs due to higher carbon price despite lower emissions
Income Statement				2024	2025	2026	2027	2028	2029	2030		Information
Revenue growth	Share of sustainable products	%		80.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%		Following company's target of 90% from 2025 onwards
	Sustainable Footwear											Applied to all segments
	Europe	%		6.4%	6.4%	6.4%	6.4%	6.4%	6.4%	6.4%		Industry CAGR 2024 - 2030
	EEMEA	%		4.8%	4.8%	4.8%	4.8%	4.8%	4.8%	4.8%		Industry CAGR 2024 - 2030
	North America	%		6.1%	6.1%	6.1%	6.1%	6.1%	6.1%	6.1%		Industry CAGR 2024 - 2030
	Latin America	%		5.3%	5.3%	5.3%	5.3%	5.3%	5.3%	5.3%		Industry CAGR 2024 - 2030
	Greater China	%		7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%		Industry CAGR 2024 - 2030
	Asia/Pacific (without Greater China)	%		7.1%	7.1%	7.1%	7.1%	7.1%	7.1%	7.1%		Industry CAGR 2024 - 2030
	Long-term impact vs. base case	%									1.0%	Driven by PUMA's strong sustainability efforts
COGS growth		%		1.3%	1.8%	2.3%	2.6%	2.8%	3.0%	3.0%		Driven by Scope 3 emissions costs
Other operating expenses		%		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		Driven by Scope 1 and 2 emissions costs

Table 18: Projected Impact on Financials of adidas under Scenario 2.2

Scenario 2.2 - Sustainability becomes less important			2017 baseline	2024	2025	2026	2027	2028	2029	2030	Terminal Value	Information
Carbon price	Weighted average direct carbon price per ton worldwide	$		44.2	65.1	86.1	107.1	128.1	149.0	170.0		Assumed the minimum price target by 2030
		€		41.3	60.9	80.4	100.0	119.6	139.2	158.8		Converted by EUR/USD rate as of 28.06.2024
Scope 1 + 2	CO2 emissions	million tons	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0		Initial target reduced to 60% of Scope 1 and 2 emissions on a 2017 baseline due to historical development
	CO2 emissions costs	€ million		6.0	7.6	8.4	8.4	7.7	6.2	3.8		Gradual increase in Other Operating Expenses by emissions costs (reduction in emission stronger than rise in carbon price, therefore decreasing effect)
Scope 3	CO2 emissions	million tons	8.0	6.1	6.3	6.5	6.7	6.8	7.0	7.2		Initial target reduced to a 10% reduction of Scope 3 emissions on a 2017 baseline
	CO2 emissions costs	€ million		251.1	381.9	520.2	666.0	819.3	980.0	1,148.2		Gradual increase in COGS by CO2 emissions costs due to higher carbon price and lower target
Total scopes	Total CO2 emissions	million tons	8.1	6.2	6.4	6.6	6.7	6.9	7.1	7.3		Total reduction of emissions by 10% on a 2017 baseline
	Total CO2 emissions costs	€ million		257.1	389.5	528.6	674.4	826.9	986.1	1,152.0		Gradual increase in costs due to higher carbon price and lower target
Income Statement				2024	2025	2026	2027	2028	2029	2030	2030	Information
Revenue growth	Share of sustainable products	%		80.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%		Following company's target of 90% from 2025 onwards
	Sustainable Footwear											Applied to all segments
	Europe	%		5.4%	5.4%	5.4%	5.4%	5.4%	5.4%	5.4%		Industry CAGR 2024 - 2030 adjusted by -1%
	North America	%		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		Industry CAGR 2024 - 2030 adjusted to reflect Trump's easing on climate regulations - sustainability lose appeal
	Greater China	%		3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%		Industry CAGR 2024 - 2030 adjusted by -4%, stronger impact by Trump's election assumed
	Emerging Markets	%		2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%		Industry CAGR 2024 - 2030 adjusted by -2% due to lower interest and cost-efficiencies
	Latin America	%		3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%		Industry CAGR 2024 - 2030 adjusted by -2% due to lower interest and cost-efficiencies
	Japan/South Korea	%		3.1%	3.1%	3.1%	3.1%	3.1%	3.1%	3.1%		Industry CAGR 2024 - 2030 adjusted by -4%, stronger impact by Trump's election assumed
	Long-term impact vs. base case	%									0.0%	
COGS growth		%		2.2%	3.0%	3.7%	4.4%	4.9%	5.3%	5.7%		Driven by Scope 3 emissions costs
Other operating expenses		%		0.1%	0.1%	0.1%	0.1%	0.1%	0.0%	0.0%		Driven by Scope 1 and 2 emissions costs

Table 19: Projected Impact on Financials of PUMA under Scenario 2.2

Scenario 2.2 - Sustainability becomes less important			2017 baseline	2024	2025	2026	2027	2028	2029	2030	Terminal Value	Information
Carbon price	Weighted average direct carbon price per ton worldwide	$		44.2	65.1	86.1	107.1	128.1	149.0	170.0		Assumed the minimum price target by 2030
		€		41.3	60.9	80.4	100.0	119.6	139.2	158.8		Converted by EUR/USD rate as of 28.06.2024
Scope 1 + 2	CO2 emissions	million tons	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		Following target of 90% reduction of Scope 1 and 2 on a 2017 baseline
	CO2 emissions costs	€ million		0.3	0.4	0.5	0.6	0.6	0.7	0.8		Gradual increase in Other Operating Expenses by emissions costs (reduction in emission weaker than rise in carbon price, therefore increasing effect)
Scope 3	CO2 emissions	million tons	1.5	1.1	1.2	1.2	1.2	1.3	1.3	1.3		Initial target reduced to a 15% reduction of Scope 3 emissions on a 2017 baseline
	CO2 emissions costs	€ million		46.6	70.6	95.8	122.3	150.1	179.0	209.2		Gradual increase in COGS by CO2 emissions costs due to higher carbon price and lower target
Total scopes	Total CO2 emissions	million tons	1.6	1.1	1.2	1.2	1.2	1.3	1.3	1.3		Total reduction of emissions by 17% on a 2017 baseline
	Total CO2 emissions costs	€ million		46.8	71.0	96.3	122.9	150.7	179.7	210.0		Gradual increase in costs due to higher carbon price and lower target
Income Statement				2024	2025	2026	2027	2028	2029	2030	2030	Information
Revenue growth	Share of sustainable products	%		80.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%		Following company's target of 90% from 2025 onwards
	Sustainable Footwear											Applied to all segments
	Europe	%		5.4%	5.4%	5.4%	5.4%	5.4%	5.4%	5.4%		Industry CAGR 2024 - 2030 adjusted by -1%
	EEMEA	%		2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%		Industry CAGR 2024 - 2030 adjusted by -2% due to lower interest and cost-efficiencie
	North America	%		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		Industry CAGR 2024 - 2030 adjusted to reflect Trump's easing on climate regulations - sustainability lose appeal
	Latin America	%		3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%		Industry CAGR 2024 - 2030 adjusted by -2% due to lower interest and cost-efficiencies
	Greater China	%		3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%		Industry CAGR 2024 - 2030 adjusted by -4%, stronger impact by Trump's election assumed
	Asia/Pacific (without Greater China)	%		3.1%	3.1%	3.1%	3.1%	3.1%	3.1%	3.1%		Industry CAGR 2024 - 2030 adjusted by -4%, stronger impact by Trump's election assumed
	Long-term impact vs. base case	%									0.5%	Driven by PUMA's strong sustainability efforts
COGS growth		%		1.0%	1.3%	1.7%	2.0%	2.2%	2.4%	2.6%		Driven by Scope 3 emissions costs
Other operating expenses		%		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		Driven by Scope 1 and 2 emissions costs

Table 20: Projected Impact on Financials of adidas under Scenario 3

			2025	2026	2027	2028	2029	2030	Terminal Value	Information
Income Statement										
Revenue growth	E-Commerce Sales Share	%	36.7%	38.7%	40.7%	42.7%	44.7%	46.7%		Following "Own The Game" expected online share by 2025, gradual increase due to numerous investments
	E-Commerce Footwear									
	Europe	%	6.5%	6.5%	6.5%	6.5%	6.5%	6.5%		Industry CAGR 2025 - 2030
	North America	%	7.1%	7.1%	7.1%	7.1%	7.1%	7.1%		Industry CAGR 2025 - 2030
	Greater China	%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%		Industry CAGR 2025 - 2030
	Emerging Markets	%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%		Industry CAGR 2025 - 2030
	Latin America	%	6.4%	6.4%	6.4%	6.4%	6.4%	6.4%		Industry CAGR 2025 - 2030
	Japan/South Korea	%	7.3%	7.3%	7.3%	7.3%	7.3%	7.3%		Industry CAGR 2025 - 2030
	E-Commerce Apparel									
	Europe	%	8.3%	8.3%	8.3%	8.3%	8.3%	8.3%		Industry CAGR 2025 - 2030
	North America	%	8.7%	8.7%	8.7%	8.7%	8.7%	8.7%		Industry CAGR 2025 - 2030
	Greater China	%	9.7%	9.7%	9.7%	9.7%	9.7%	9.7%		Industry CAGR 2025 - 2030
	Emerging Markets	%	7.6%	7.6%	7.6%	7.6%	7.6%	7.6%		Industry CAGR 2025 - 2030
	Latin America	%	7.6%	7.6%	7.6%	7.6%	7.6%	7.6%		Industry CAGR 2025 - 2030
	Japan/South Korea	%	9.5%	9.5%	9.5%	9.5%	9.5%	9.5%		Industry CAGR 2025 - 2030
	vs. base case	%	2.9%	3.1%	3.2%	3.4%	3.5%	3.7%	1.0%	
COGS growth		%	-0.5%	-1.5%	-2.5%	-3.5%	-4.5%	-5.5%		Gradual decrease due to production efficiencies
Other operating expenses	Distribution and selling expenses	%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%		Histocial CAGR 2013 - 2023
	Administrative and general expenses	%	4.0%	3.0%	2.0%	1.0%	0.0%	-1.5%		Increase of technical team to monitor the systems, followed by reduction of workforce by replacing activities with AI
Balance Sheet										
Average holding period		days	142.2	139.5	136.8	134.0	131.3	128.6		Leverage of AI in inventory management, optimizing inventory control and reducing AHP below industry average
Trademarks and other intangible assets	Investments	% of sales	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%		Following "Own The Game" strategy of EUR 1 billion in 2025, followed by constant increase of share due to continous updates on technology

Table 21: Projected Impact on Financials of PUMA under Scenario 3

			2025	2026	2027	2028	2029	2030	Terminal Value	Information
Income Statement										
Revenue growth	E-Commerce Sales Share	%	12.1%	13.1%	14.1%	15.1%	16.1%	17.1%		Gradual increase due to multi-year agreement with Google Cloud
	E-Commerce Footwear									
	Europe	%	6.5%	6.5%	6.5%	6.5%	6.5%	6.5%		Industry CAGR 2025 - 2030
	EEMEA	%	5.1%	5.1%	5.1%	5.1%	5.1%	5.1%		Industry CAGR 2025 - 2030
	North America	%	7.1%	7.1%	7.1%	7.1%	7.1%	7.1%		Industry CAGR 2025 - 2030
	Latin America	%	6.4%	6.4%	6.4%	6.4%	6.4%	6.4%		Industry CAGR 2025 - 2030
	Greater China	%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%		Industry CAGR 2025 - 2030
	Asia/Pacific (without Greater China)	%	6.9%	6.9%	6.9%	6.9%	6.9%	6.9%		Industry CAGR 2025 - 2030
	E-Commerce Apparel									
	Europe	%	8.3%	8.3%	8.3%	8.3%	8.3%	8.3%		Industry CAGR 2025 - 2030
	EEMEA	%	6.1%	6.1%	6.1%	6.1%	6.1%	6.1%		Industry CAGR 2025 - 2030
	North America	%	8.7%	8.7%	8.7%	8.7%	8.7%	8.7%		Industry CAGR 2025 - 2030
	Latin America	%	7.6%	7.6%	7.6%	7.6%	7.6%	7.6%		Industry CAGR 2025 - 2030
	Greater China	%	9.7%	9.7%	9.7%	9.7%	9.7%	9.7%		Industry CAGR 2025 - 2030
	Asia/Pacific (without Greater China)	%	8.8%	8.8%	8.8%	8.8%	8.8%	8.8%		Industry CAGR 2025 - 2030
	vs. base case	%	0.9%	0.9%	1.0%	1.1%	1.2%	1.2%	1.0%	
COGS growth		%	-0.5%	-1.0%	-1.5%	-2.0%	-2.5%	-3.5%		Gradual decrease due to production efficiencies
Other operating expenses	Research and development	%	8.3%	8.3%	8.3%	8.3%	7.3%	6.3%		Historical growth of 2023 for four years, following gradual decline by 1% per annum
	Administrative and general expenses	%	4.0%	3.5%	3.0%	2.5%	2.0%	1.5%		Increase of technical team to monitor the systems, followed by reduction of workforce by replacing activities with AI
Balance Sheet										
Average holding period		days	153.1	149.2	145.3	141.4	137.5	133.6		Leverage of AI in inventory management, optimizing inventory control and reducing AHP below industry average
Other intangible assets	Investments	% of sales	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%		Constant increase of share due to continous updates on technology

Table 22: Stock Characteristics of adidas and PUMA from July 2017 to June 2024

	adidas	**PUMA**
Expected Return monthly	0.7%	0.8%
Standard Deviation monthly	8.8%	10.0%
Expected Return annually	8.6%	9.4%
Standard Deviation annually	30.4%	34.5%

Covariance annually	**adidas**	**PUMA**
adidas	0.0911	0.0605
PUMA	0.0605	0.1179

Table 23: Portfolio Characteristics from July 2017 to June 2024

	Weights	**Annual Volatility**	**Expected Annual Return**
adidas	-100.0%	30.4%	8.6%
PUMA	100.0%	34.5%	9.4%
Long-short Portfolio	**0.0%**	**29.7%**	**0.8%**