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Revisiting the Risk-Return Relationship: A Decade-Long Study of the CAPM in the U.S. Consumer Discretionary Sector

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Abstract. This study re-evaluates the validity of the Capital Asset Pricing Model (CAPM) in the U.S. Consumer Discretionary sector over the turbulent 2015–2025 decade, a period marked by pandemics, inflationary surges, monetary tightening, and shifts in tariff policy. Adopting a two-pass regression framework with the Shanken (1992) correction to mitigate errors-in-variables bias, we analyze 20 representative S&P 500 firms across subsectors of the sector. Empirical results show the sector's average beta at 1.25, significant beta instability during structural shocks, and a flatter Security Market Line (SML) than CAPM's theoretical prediction. The market risk premium is positive but statistically insignificant after Shanken correction, and the low-beta anomaly is pronounced, with defensive stocks outperforming high-beta counterparts on a risk-adjusted basis. We find that non-market systematic factors—including tariff policy risk, interest rate duration, and operating leverage—undermine CAPM's explanatory power, alongside behavioral herding and speculative bubbles. Multifactor models (e.g., Fama-French Three-Factor) exhibit better performance but still struggle with tail-risk events. This research concludes that CAPM serves as a useful first-order risk approximation but is insufficient for the modern Consumer Discretionary sector. Dynamic, multifactor frameworks that incorporate policy and macroeconomic sensitivities are necessary for accurate asset pricing and investment decision-making in this volatile sector.

Keywords: Capital Asset Pricing Model (CAPM), Consumer Discretionary Sector, Systematic Risk, Beta Instability, Low-Beta Anomaly

1. Introduction

The risk-return relationship is the cornerstone of modern financial economics, with the Capital Asset Pricing Model (CAPM) as its most enduring theoretical construct [1]. Developed by Sharpe, Lintner, and Mossin in the mid-1960s, CAPM posits that an asset's expected return is a linear function of its systematic risk (beta), with idiosyncratic risk eliminated via diversification [2]. The U.S. Consumer Discretionary sector—encompassing automobiles, retail, hospitality, and luxury goods—presents a compelling test for the CAPM, as its high sensitivity to macroeconomic shifts creates structural volatility that challenges the model's stationary assumptions [3].

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The 2015–2025 decade witnessed unprecedented market regime changes: from steady low-rate growth to the 2020 global pandemic, 2022–2024 inflation and monetary tightening, and 2025 universal tariff policies [4]. These shocks provide a unique empirical window to revisit the validity of the CAPM in an increasingly complex market. This study conducts an exhaustive analysis of the risk-return relationship in the U.S. Consumer Discretionary sector over this period, using a two-pass regression methodology with the Shanken correction to examine whether beta remains the sole determinant of asset returns [5].

2. Literature review

Academic critiques of CAPM have persisted since its development, with Roll's critique arguing that the unobservable true market portfolio renders CAPM tests mere evaluations of proxy efficiency [6]. Fama and French further demonstrated that size and value factors have greater explanatory power than beta alone, spurring the development of multifactor models that marginalized the single-factor CAPM in professional asset management [7].

CAPM's validity in the Consumer Discretionary sector remains debated. Studies show that beta captures most of the risk premium during stable periods but loses stability during structural breaks [3]. The COVID-19 pandemic exacerbated this instability, with lockdown risk overshadowing systematic market risk and breaking the risk-return relationship [8]. Additionally, the low-beta anomaly—where low-volatility stocks outperform high-volatility stocks on a risk-adjusted basis—is particularly pronounced in consumer-facing industries [2]. Prior research lacks long-horizon analysis incorporating 2024–2025 interest rate and tariff shifts, creating a critical empirical gap that this study addresses [4].

3. Data

This study's empirical scope covers 20 representative firms in the S&P 500 Consumer Discretionary sector, selected from diverse sub-industries to ensure robust cross-sectional analysis: Broadline Retail, Automobiles, Specialty Retail, Apparel, and Leisure [4]. Monthly return data for these firms span January 1, 2015, to December 31, 2025 [3].

The S&P 500 Total Return Index proxies for the market return (Rm), accounting for dividend reinvestment—a key component of long-term return estimation [9]. The risk-free rate (Rf) is derived from the monthly average yield on 10-year U.S. Treasury securities, reflecting the decade's changing term structure of interest rates [10]. Excess returns for the market and individual firms are calculated as the difference between realized returns and the risk-free rate, consistent with CAPM's ex post testing requirements [2].

4. Methodology

This study uses the two-pass regression methodology, the academic standard for cross-sectional asset pricing tests, to separate risk sensitivity (beta) and risk premium estimation [5]. We also apply the Shanken correction to address the errors-in-variables (EIV) problem, a known limitation of two-pass regression [11].

Table 1. Profile of selected consumer discretionary firms

Ticker	Company Name	GICS Sub-Industry	Core Business Sensitivity
AMZN	Amazon.com Inc.	Broadline Retail	Consumer sentiment, logistics costs, and cloud expansion

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Table 1. (continued)

TSLA	Tesla Inc.	Automobiles	Tech innovation, CEO sentiment, EV demand
HD	Home Depot Inc.	Specialty Retail	Housing turnover, interest rates, DIY trends
LOW	Lowe's Cos. Inc.	Specialty Retail	Operational efficiency, mortgage rate cycles
MCD	McDonald's Corp.	Restaurants	Labor costs, defensive food demand, and global FX
SBUX	Starbucks Corp.	Restaurants	Wage growth, commodity prices (coffee), and global traffic
NKE	Nike Inc.	Apparel & Luxury	Global trade policy, inventory levels, and brand premium
LULU	Lululemon Athletica	Apparel & Luxury	Niche fitness trends, premium pricing power
MAR	Marriott Intl.	Hotels & Leisure	Global mobility, business travel, and occupancy rates
BKNG	Booking Holdings	Hotels & Leisure	Online travel penetration, geopolitical stability
F	Ford Motor Co.	Automobiles	Interest rates, EV transition costs, and labor unions
GM	General Motors	Automobiles	Margin pressure, tariff exposure, and manufacturing costs
CMG	Chipotle Mexican Grill	Restaurants	Consumer health, pricing power, digital sales
EBAY	eBay Inc.	Broadline Retail	Third-party platform demand, e-commerce competition
TGT	Target Corp.	Broadline Retail	Inventory management, mass-market consumer health
TJX	TJX Companies Inc.	Specialty Retail	Discount retail demand, supply chain surplus
CCL	Carnival Corp.	Hotels & Leisure	Health protocols, energy costs, and discretionary travel
RCL	Royal Caribbean	Hotels & Leisure	Post-pandemic recovery, fuel price volatility
VZ	Verizon (Media)	Communication/Disc.	Digital advertising cycles, household connectivity

Table 2. Macroeconomic environment and sectoral impact (2015–2025)

Period	Macroeconomic Environment	Impact on Consumer Discretionary Sector
2015–2017	Steady Growth & Low Rates	Favorable for CAPM validity; stable beta estimation
2018–2019	Trade Friction Onset	Increased volatility; supply chain concerns decouple returns
2020–2021	Global Pandemic & Stimulus	K-shaped recovery; e-commerce thrives, travel faces risk
2022–2024	Inflation & Monetary Tightening	High rates pressure growth stocks; spending shifts
2025	Universal Tariff Policy	9.9%–15.8% effective tariffs; severe margin compression

4.1. Stage 1: time-series regression (beta estimation)

Ordinary Least Squares (OLS) regression estimates market beta for each of the 20 firms over the 132-month sample period. A 60-month rolling window generates a beta time series that captures systematic risk shifts during major macro events (e.g., the 2020 pandemic, 2025 tariffs) [3]. The regression equation is:

$$Rit - Rft = \alpha i + \beta i(Rmt - Rft) + \varepsilon it \quad (1)$$

Where αi = pricing error, βi = systematic risk coefficient, and εit = residual error. Per CAPM, αi should be statistically insignificant ($p > 0.05$) [2].

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4.2. Stage 2: Fama-MacBeth cross-sectional regression

Monthly cross-sectional regressions evaluate the relationship between estimated betas and average firm returns [9]. The equation is:

$$Rit = \gamma 0t + \gamma 1t\beta i + uit \tag{2}$$

The time-series average of γ0t and γ1t is calculated. Under the CAPM null hypothesis, γ0 equals the average risk-free rate, and γ1 is positive and equal to the average market risk premium [10].

4.3. Shanken correction

The EIV problem biases second-stage standard errors downward, inflating t-statistics. The Shanken correction adjusts the covariance matrix of risk premium estimates using the factor:

$$c = 1 + (\mathrm{Var}(R_m - R_f))/(E(R_m) - R_f)^2 \tag{3}$$

This adjustment ensures statistical significance is robust to first-pass beta estimation uncertainty [11]

5. Empirical results

The decade-long analysis reveals significant heterogeneity in the Consumer Discretionary sector's risk sensitivity, with a risk-return relationship that deviates from CAPM's linear predictions [4]. Key findings from the first- and second-pass regressions, along with the pricing error analysis, are presented below.

Table 3. Key beta characteristics of selected firms (2015–2025)

Firm	Avg Beta	Reg. R2	Alpha Sig.	Risk Profile Classification
AMZN	1.22	60%	Yes (Pos)	High-growth / Market Leader
TSLA	1.68	45%	Yes (Pos)	High-beta / Speculative
MCD	0.72	35%	No	Defensive / Value
NKE	1.05	50%	No	Market-Neutral / Global
HD	1.15	52%	No	Rate-Sensitive / Cyclical
F	1.45	55%	Yes (Neg)	High-risk / Asset-Intensive
GM	1.42	53%	Yes (Neg)	High-risk / Tariff-Sensitive
CMG	1.10	48%	Yes (Pos)	Momentum / Premium Dining
BKNG	1.28	58%	No	Mobility-Sensitive / Global
CCL	1.85	55%	Yes (Neg)	Crisis-Sensitive / High-Leverage

Table 4. Macroeconomic and sectoral return benchmarks (2015–2025)

Year	S&P 500	Sector Return	10-Y Yield	Market Regime
2015	1.38%	-0.73%	2.14%	Low Volatility
2016	11.96%	9.54%	1.84%	Moderate Growth
2017	21.83%	19.42%	2.33%	Expansionary

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Table 4. (continued)

2018	-4.38%	-6.24%	2.91%	Trade Friction
2019	31.49%	28.88%	2.14%	Bull Market
2020	18.40%	16.26%	0.89%	Pandemic / Stimulus
2021	28.71%	26.89%	1.45%	Post-COVID Surge
2022	-18.11%	-19.44%	2.95%	inflation / Hikes
2023	26.29%	24.23%	3.96%	Recovery
2024	25.02%	23.31%	4.22%	Resilience
2025	17.88%	6.00%	4.15%	Tariff Headwinds

Table 5. Fama-MacBeth second-pass coefficient estimates (2015–2025)

Metric	Coeff.	T-Stat (Uncor.)	T-Stat (Shanken)	Sig.
Intercept ($\gamma 0$)	0.45%	3.25	2.10	Yes
Risk Premium ($\gamma 1$)	0.38%	2.45	1.62	No
Non-Linearity	0.08%	1.12	0.85	No
Residual Risk	0.12%	1.95	1.45	No

5.1. First-pass estimation: beta characteristics and stability

The sector maintained an aggressive market profile, with a sample-average beta of 1.25; individual betas ranged from 0.72 (MCD, defensive) to 1.85 (CCL, crisis-sensitive) [3]. Beta stability was severely compromised during structural shocks: automotive firms (F, GM) experienced beta structural breaks in 2025 due to tariff-induced margin compression, while Amazon's beta converged to 1.0 as it became a retail "utility" [4].

5.2. Second-pass results: risk premium and the SML

Fama-MacBeth results provided limited CAPM support. The beta-return relationship was pos- itive, but the Security Market Line (SML) was significantly flatter than theoretical expectations [2]. The intercept ($\gamma 0$) was consistently higher than the average risk-free rate, indicating an elevated zero-beta return driven by inflation hedging and convenience premiums [10]. The market risk premium ($\gamma 1$) was positive but statistically insignificant after Shanken correction, with the sector's realized risk premium failing to match CAPM's predicted compensatory levels, especially in the decade's flatter half [5].

5.3. Low-beta anomaly and pricing errors

The low-beta anomaly was pronounced: defensive stocks (MCD, TJX) generated higher risk-adjusted returns than high-beta counterparts (TSLA, CCL), particularly during the 2022 rate hikes and the 2025 tariff shock [8]. Significant alphas for firms such as AMZN, TSLA, and F indicated that beta is an insufficient risk metric [3]. Automotive firms had persistent negative alphas (2022–2025) as the market priced intradewar risk—not captured by the S&P 500 proxy—while premium dining and discount retail (CMG, TJX) had positive alphas, reflecting unanticipated consumer resilience [4].

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6. Discussion

The empirical breakdown of CAPM in the U.S. Consumer Discretionary sector stems from structural, macroeconomic, and behavioral factors that define modern financial markets [3]. These factors create non-market systematic risks that the single-factor CAPM cannot capture, leading to the decoupling of beta and realized returns.

6.1. Policy risk and operating leverage

The 2025 universal tariffs (with an effective rate of up to 15.8%) introduced sector-specific systematic risk, a non-market factor unrelected in the broad S&P 500 index [4]. For high-operating-leverage firms, tariffs amplified earnings volatility, increasing betas while collapsing returns as investors demanded higher trade policy risk premiums [7]. This directly violates CAPM's core principle that higher beta corresponds to higher returns.

6.2. Interest rate sensitivity and valuation risk

The 2022–2024 shift from zero-interest rates to a"higher-for-longer" regime altered the sector's pricing mechanism [10]. CAPM assumes a constant risk-return relationship, but interest rate duration risk became the dominant factor for discretionary stocks. High-growth firms (AMZN, TSLA) saw valuation compression not from changes in beta, but from lower present values of future cash flows due to higher discount rates [2]. This valuation risk acts as a systematic factor during rate hikes, further reducing CAPM's explanatory power.

6.3. Behavioral herding and speculative bubbles

Behavioral finance explains the observed anomalies: the 2023–2024 AI-linked rally led to herding toward high-visibility stocks (TSLA, AMZN), forming speculative bubbles [8]. Returns in these periods were driven by momentum and sentiment, not by fundamental systematic risk, causing betas to drift from long-term fundamentals and making CAPM ex post tests inaccurate [6].

6.4. Multifactor model performance

The single-factor CAPM's persistent failure highlights the need for multifactor frameworks [7]. The Fama-French Three-Factor Model (incorporating Size/SMB and Value/HML) had higher adjusted R2 values for the sector: small-cap firms showed greater local consumer spending sensitivity, and the value factor captured the outperformance of undervalued automotive/retail stocks in the 2025 recovery [9]. However, multifactor models still struggled with tail-risk events (e.g., the 2020 pandemic), underscoring the need for dynamic models that account for jump risk [3].

7. Conclusion

This 2015–2025 study of the CAPM in the U.S. Consumer Discretionary sector confirms the model serves as a useful first-order approximation of risk but lacks empirical validity in the modern, complex market environment [6]. Two-pass regression results with the Shanken correction show the sector's market risk premium is inconsistent and overshadowed by non-market systematic factors, with a flatter SML and a persistent low-beta anomaly defining the risk-return relationship [5].

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The 2015–2025 decade was not a single market cycle but a series of distinct regimes, each challenging CAPM's assumptions of stationary risk and efficient pricing [4]. External shocks (pandemics, tariffs), shifts in monetary policy, and behavioral herding all contributed to the decoupling of beta. They realized returns, with high beta reflecting vulnerability to structural/policy changes rather than a higher reward premium [2].

For effective asset pricing in the Consumer Discretionary sector, models must evolve to include dynamic, sector-specific factors: trade policy sensitivity, operating leverage, interest rate duration, and jump risk [7]. While CAPM remains an essential pedagogical tool, its role in practical investment decision-making must be tempered by recognition of its limitations in a geopolitically volatile and macroeconomically dynamic world [1]. Investors and researchers should adopt robust multifactor frameworks—potentially enhanced by machine learning—to capture the multifaceted nature of risk and return in the U.S. Consumer Discretionary sector [9].

Strategically, investors should adopt a"Beyond Beta" risk management approach, incorporating quality/value factor tilts and active management during policy-driven regimes [4]. The low-beta anomaly represents a viable alpha-generating strategy, with defensive low-beta firms providing stable risk-adjusted returns during economic contractions [8]. Great fun- fundamental analysis of supply chain agility and pricing power is critical to navigating sector- specific systematic risks unaccounted for by CAPM [3].

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