

One Model Many Worlds: The Inadequacy of CAPM for Indian IPO Valuation

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Abstract

The Capital Asset Pricing Model has historically served as a fundamental instrument in financial economics, establishing a straightforward nexus between systematic risk exposure and anticipated returns. However, its implementation within India's initial public offering ecosystem exposes critical inadequacies. This investigation scrutinizes CAPM's conceptual and empirical shortcomings when applied to Indian IPO contexts, with particular emphasis on the 2021 public listings of Zomato and Paytm.

Through integrated analysis of regulatory documents, market performance metrics, and scholarly literature, this study demonstrates that CAPM's foundational premises—including market efficiency, homogeneous investor expectations, and singular risk representation—collapse under India's institutional realities characterized by information disparities, liquidity frictions, and behavioral anomalies. Empirical estimation reveals standard CAPM generates cost-of-equity figures between 13-15%, whereas Damodaran's country-risk-adjusted variant produces more defensible estimates of 16-18%, demonstrating superior alignment with observed market corrections.

The research advances a synthesized valuation architecture combining quantitative adjustments (incorporating country premiums, liquidity factors, downside risk metrics) with qualitative dimensions (governance assessment, sentiment analysis, regulatory compliance). This integrated approach enhances precision in emerging market contexts while acknowledging CAPM's pedagogical utility alongside its practical obsolescence for Indian IPO pricing.

Keywords: Asset Pricing Models, Emerging Market Valuation, Initial Public Offerings, Indian Capital Markets, Behavioural Finance

1. Introduction

1.1 Contextual Background

The theoretical framework established by Sharpe (1964), Lintner (1965), and Black (1972) continues influencing contemporary financial practice through the Capital Asset Pricing Model's elegant formulation linking expected returns to systematic risk via beta coefficients. This model underpins valuation methodologies, investment decisions, and portfolio construction across global markets, utilizing risk-free rates and market premiums as fundamental inputs.

However, applying this framework to India's initial public offering landscape—particularly for technology-driven, pre-profitability enterprises—reveals substantial disconnects between theoretical elegance and empirical reality. India's capital markets exhibit heterogeneity, behavioral complexity, and liquidity constraints inconsistent with CAPM's assumptions of efficient markets, uniform expectations, and frictionless trading environments.

1.2 Research Problem

Despite CAPM's widespread adoption in academic and professional valuation contexts, its application to recent Indian IPOs such as Zomato and Paytm has exposed significant pricing distortions. The model's dependence on historical beta calculations and single-factor risk representation neglects critical determinants prevalent in Indian markets including information asymmetry, post-listing liquidity constraints, macroeconomic volatility, and retail investor behavioral biases.

India's emerging market characteristics—encompassing sovereign risk, currency fluctuations, and political uncertainty—receive inadequate treatment in standard CAPM formulations that assume globally risk-free government securities serve as appropriate baseline proxies. Consequently, IPOs frequently experience initial overvaluation followed by post-listing underperformance, signaling systematic risk mispricing.

1.3 Research Contribution

While substantial literature examines CAPM's empirical validity across Indian equity markets, limited research explicitly connects these theoretical inadequacies to IPO mispricing phenomena, particularly regarding new-economy, loss-making technology enterprises. Prior investigations predominantly focused on index-based or secondary-market returns, creating a conceptual gap in understanding newly listed firm mispricing mechanisms. This investigation bridges that divide by linking CAPM's theoretical limitations to documented valuation outcomes from Zomato and Paytm offerings, contextualized within India's capital market structure.

1.4 Research Objectives

This study pursues five interconnected aims:

1. Evaluate CAPM's theoretical foundations and empirical performance within emerging market contexts, emphasizing Indian specificities
2. Identify and categorize structural limitations constraining CAPM's applicability to Indian IPO valuations
3. Analyze Zomato and Paytm public offerings as demonstrative cases of CAPM's practical inadequacy
4. Explore alternative frameworks including Damodaran's adjusted formulations, Fama-French multifactor approaches, and Estrada's downside risk models
5. Propose an integrated valuation architecture incorporating quantitative adjustments and qualitative factors for enhanced Indian IPO pricing accuracy

2. Theoretical Framework

2.1 CAPM Development and Foundations

Building upon Markowitz's (1952) Modern Portfolio Theory establishing risk-return relationships through mean-variance optimization, Sharpe (1964), Lintner (1965), and Mossin (1966) independently developed CAPM as a formal equilibrium model linking asset expected returns to market risk. The model's central insight posits that rational, risk-averse investors maintaining diversified portfolios eliminate unsystematic risk, warranting compensation solely for systematic market risk exposure.

The standard formulation expresses this relationship as:

$$E(R_i) = R_f + \beta_i [E(R_m) - R_f]$$

Where expected return on asset i equals the risk-free rate plus beta-weighted market premium. This linear specification implies proportional excess returns relative to systematic risk exposure, with the intercept representing baseline risk-free returns and slope capturing per-unit risk compensation.

2.2 Core Assumptions

CAPM's mathematical elegance derives from several simplifying premises that simultaneously constitute empirical limitations, particularly within emerging markets. Key assumptions encompass: investor rationality and risk aversion based solely on return mean-variance; single-period investment horizons; homogeneous expectations regarding returns, variances, and covariances; perfect capital markets absent taxes, transaction costs, or short-selling restrictions; unlimited borrowing and lending at identical risk-free rates; and market equilibrium where all investors hold risk-free asset and market portfolio combinations.

These idealized conditions rarely manifest in emerging markets characterized by asymmetric information, institutional inefficiencies, and behavioral distortions—central to understanding CAPM's underperformance in Indian IPO contexts.

2.3 Risk-Free Rate and Market Premium Challenges

According to Damodaran (2008), truly risk-free assets possess neither default nor reinvestment risk. While developed economy government securities approximate this standard, emerging market sovereign bonds embed default, inflation, and currency risks requiring country-specific adjustments. Damodaran (2015) proposed incorporating Country Risk Premiums (CRP) accounting for political, inflationary, and currency exposures in emerging economies.

The adjusted specification becomes:

$$E(R_i) = R_f + \beta_i [E(R_m) - R_f + CRP]$$

This modification enhances cross-country comparability while reflecting additional risks facing emerging market investors.

2.4 CAPM in IPO Contexts

Initial public offerings present unique challenges: absent historical trading data renders beta estimation unreliable; pricing depends on market sentiment and underwriter discretion, often deviating from fundamental value; retail investor behavioral biases including herding and overconfidence amplify short-term volatility, violating equilibrium assumptions.

Empirical evidence indicates that while CAPM approximates expected returns for large, liquid stocks, it systematically misprices newly listed, high-growth firms with uncertain earnings trajectories.

Assumption	Description	Indian Market Reality	Implication for IPOs
Perfect markets	No taxes, frictionless trading	High transaction costs, volatility, retail dominance	Cost of equity underestimated
Homogeneous expectations	All investors share same info	Asymmetric information, opaque disclosures	Mispricing and herd behavior
Unlimited borrowing/lending	Investors borrow/lend at R_f	Restricted leverage; credit access uneven	Beta-based risk distorted
Single investment horizon	One-period equilibrium	Multi-period, speculative trading	CAPM fails to predict post-listing volatility
Rational investors	Mean-variance optimization	Behavioral biases (herding, anchoring)	IPO overvaluation & short-term bubbles

Table 1. CAPM Assumptions vs Indian Market Reality

3. CAPM Limitations in Indian IPO Markets

3.1 Overview

CAPM's real-world performance has faced challenges across developed and emerging markets, with limitations particularly evident in Indian IPOs where valuation incorporates growth uncertainties, liquidity constraints, and investor behavior factors absent from single-factor frameworks. Indian empirical studies by Choudhary and Choudhary (2010), Sobti (2016), Rabha (2018), and Suraj et al. (2020) demonstrate CAPM's failure explaining return variations or accurately capturing systematic risk, particularly for smaller or newly listed enterprises.

3.2 Market Inefficiency and Information Asymmetry

CAPM presumes informationally efficient markets with homogeneous investor expectations. However, pronounced information asymmetry persists between institutional underwriters, company insiders, and retail participants in India. Stock prices frequently deviate from intrinsic values due to incomplete or delayed information dissemination.

IPO issuers, particularly technology companies, often disclose limited financial track records, forcing underwriters toward forward-looking projections rather than observable earnings—violating CAPM's assumption that expected returns represent rational systematic risk forecasts.

3.3 Liquidity Constraints

CAPM assumes perfect asset liquidity and continuous trading. Indian markets, especially for small- and mid-cap IPOs, exhibit persistent liquidity constraints from limited institutional participation and elevated transaction costs. Kumar and Misra (2019) empirically demonstrated that systematic liquidity risk significantly influences Indian expected returns, validating Liquidity-Adjusted CAPM as superior alternative.

IPO stocks experience sharp liquidity cycles: oversubscription and high listing-day volumes followed by steep turnover declines. This volatility inflates short-term returns unrelated to fundamental risk, rendering CAPM beta unreliable as performance predictor.

3.4 Country Risk and Macroeconomic Volatility

Traditional CAPM employs domestic government bond yields as risk-free rates, assuming stable, default-free benchmarks. Damodaran (2003, 2015) argues this assumption fails in emerging markets where sovereign bonds embed default, inflation, and currency risks. India's persistent rupee depreciation, inflation variability, and policy uncertainty introduce additional Country Risk Premium typically estimated at 2-4% above global equity premiums.

Omitting CRP in standard formulations leads to cost-of-equity underestimation and consequent IPO overvaluation, especially in capital-intensive or export-dependent sectors.

3.5 Governance and Behavioral Dimensions

Indian capital markets feature dominance of family-owned or promoter-driven firms exhibiting governance issues including related-party transactions, opaque capital structures, or discretionary decision-making. CAPM, as market-based quantitative model, cannot account for qualitative governance risk. Studies by Rabha (2018) and Choudhary & Choudhary (2010) note that unsystematic governance shocks materially affect valuations yet remain unpriced in CAPM framework.

CAPM presumes rational investor behavior and normally distributed returns. India's retail-dominated IPO market exhibits behavioral biases including overconfidence, herding, and sentiment-driven trading dominating fundamentals. Sobti (2016) highlighted that deviations from rational pricing arise partly from behavioral anomalies inconsistent with Efficient Market Hypothesis assumptions.

3.6 Empirical Evidence Synthesis

Major Indian CAPM tests reinforce conceptual critiques. Choudhary & Choudhary (2010) found no significant linear beta-return relation using BSE 500 data; Sobti (2016) demonstrated Fama-French model superiority for S&P CNX 500; Rabha (2018) showed beta inconsistency for smaller firms; Suraj et al. (2020) confirmed CAPM holds weakly only for large-caps; Kumar & Misra (2019) validated liquidity risk pricing; and Damodaran (2015) emphasized country risk premium criticality for emerging markets.

Collectively, evidence reveals CAPM functions reasonably only for large, liquid, information-efficient stocks, not for IPO firms lacking trading history and transparent fundamentals.

Author(s)	Period	Sample	Methodology	Finding
Choudhary & Choudhary (2010)	1996–2009	BSE 500	Regression on beta–return	No significant beta–return link
Sobti (2016)	2005–2015	S&P CNX 500	Fama–French vs CAPM	FF model superior
Rabha (2018)	2010–2017	200 NSE stocks	Time-series CAPM test	CAPM valid only for large-caps
Suraj et al. (2020)	2012–2018	Sensex 30	Panel regression	CAPM weak for small/mid-caps
Kumar & Misra (2019)	2000–2018	NSE 500	Liquidity-adjusted CAPM	Liquidity significant driver

Table 2. Empirical Studies Testing CAPM in India

4. Case Study Evidence: Zomato and Paytm IPOs

4.1 Case Background

The 2021 IPO boom marked a watershed for India's capital markets, led by Zomato Limited (July 2021) and One97 Communications Limited/Paytm (November 2021). These offerings signified new-age, loss-making technology firms accessing public markets, challenging conventional valuation frameworks including CAPM.

4.2 Zomato IPO Overview

Zomato's Red Herring Prospectus outlined a ₹9,375 crore public offering with ₹72-76 per share pricing band, valuing the company near \$8.5 billion. Per Economic Times (2021), SEBI granted final approval July 2, 2021, with the IPO oversubscribed 38×, driven by institutional and retail enthusiasm. Shares listed at ₹115 (52% premium) but corrected to ~₹90 by early 2022.

Zomato's DRHP acknowledged persistent losses and uncertain near-term profitability. Damodaran (2021) valued Zomato at approximately ₹41 per share, significantly below IPO pricing, noting that implied cost of equity from market pricing was unrealistically low for emerging markets.

4.3 Paytm IPO Overview

Paytm's IPO, India's largest then, raised ₹18,300 crore at ₹2,150 per share, valuing the company at \$19.5 billion. Upon listing, stock fell 27% day-one to ₹1,564 and further to ₹1,000 within months, erasing over ₹50,000 crore market capitalization.

Following volatile listings, SEBI proposed enhanced IPO pricing norms and disclosure requirements for loss-making startups. Analysts attributed Paytm's decline to overvaluation, weak governance communication, and unrealistic risk assumptions—issues CAPM overlooks.

4.4 Comparative Valuation Analysis

Cost-of-equity estimates using standard versus adjusted CAPM reveal significant disparities:

Standard CAPM:

- Risk-free rate (Rf): 6.2% (10-year G-Sec, July/Nov 2021)
- Market risk premium: 12% (NIFTY 50 CAGR 2016-2021)

- Beta: Zomato 1.2, Paytm 1.5
- Cost of equity: Zomato 13.4%, Paytm 15.7%

Adjusted CAPM (with 2.5% CRP):

- Cost of equity: Zomato 15.9%, Paytm 18.2%

Under standard CAPM, both companies show moderate equity costs implying valuations similar to developed-market firms. However, adjusted models incorporating country risk premium raise costs to 16-18%, reducing present value of future cash flows by 20-25% and aligning valuations closer to fundamental expectations.

4.5 Post-Listing Performance

Zomato listed at ₹115 (+51% day-one) but declined to ₹86 six months later (-25%), reflecting short-term overpricing correction as speculative demand eased. Paytm listed at ₹1,564 (-27% day-one) and fell to ₹950 six months later (-56%), demonstrating persistent decline from market risk reassessment.

Both offerings exhibited sharp divergence between listing enthusiasm and post-listing correction, validating the hypothesis that CAPM-based valuations ignore key India-specific risks.

4.6 Key Observations

First, CAPM's simplified framework overlooked critical risks including country premium, market volatility, and startup-specific uncertainty, producing unrealistic equity costs and inflated valuations. Second, incorporating Country Risk Premium via Damodaran's model yields higher, more realistic discount rates aligning better with observed corrections. Third, post-2021 SEBI reforms emphasizing enhanced disclosures represent implicit acknowledgment that CAPM alone inadequately prices IPOs. Fourth, analysts and regulators should adopt hybrid models integrating adjusted risk premiums, sector-specific factors, and qualitative assessments for robust Indian IPO valuations.

5. Alternative Valuation Frameworks**5.1 Adjusted CAPM with Country Risk Premium**

Damodaran (2003, 2015) proposes that emerging market expected returns must reflect Country Risk Premiums arising from macroeconomic, political, and currency exposures. The equity risk premium combines global market premium with country-specific component, often derived from sovereign default spreads or adjusted using relative equity market volatility. For India, Damodaran (2021) estimated CRP of 2.5-3%, reflecting elevated political and inflationary volatility.

Advantages: Corrects cost-of-equity underestimation; captures macroeconomic instability and currency risk; provides transparent, country-level adjustment.

Limitations: CRP remains dynamic and subject to estimation bias; does not explicitly capture firm-level liquidity or behavioral effects.

5.2 Fama-French Three-Factor Model

Recognizing beta's inadequacy explaining return variations, Fama and French (1993) introduced size (SMB - Small Minus Big) and value (HML - High Minus Low) factors to CAPM. In India, Sobti (2016) found the Fama-French model significantly improved explanatory power over CAPM for S&P CNX 500 (2005-2015), confirming persistent size effects but weak value effects.

Advantages: Explains cross-sectional returns better than CAPM; captures firm characteristics influencing IPO performance.

Limitations: Data-intensive requiring long-term trading history unavailable for new IPOs; does not explicitly incorporate macro or country-level risk.

5.3 Carhart Four-Factor Model

Extending Fama-French, Carhart (1997) added a momentum factor (MOM), acknowledging that high recent-return stocks tend continuing outperformance short-term. This aligns with behavioral finance insights particularly relevant for IPOs where investor sentiment drives early-month momentum.

5.4 Downside Risk CAPM

Traditional CAPM penalizes upside and downside volatility equally. However, investors typically exhibit greater sensitivity to downside losses. Estrada (2000) introduced Downside CAPM replacing total variance with semi-variance, emphasizing loss risk below mean. Studies in emerging markets show D-CAPM provides more stable expected return estimates than classical CAPM.

Advantages: Better reflects investor risk perception in volatile markets; useful for new listings with asymmetric return distributions.

Limitations: Requires detailed return distribution data challenging for short-history IPOs; does not address liquidity or governance risks.

5.5 Hybrid Valuation Architecture

Emerging-market IPOs face non-quantifiable risks—governance quality, management credibility, business model scalability, investor sentiment—which traditional CAPM cannot capture. Post-2021, SEBI (2022) proposed mandatory disclosure of key performance indicators, pre-IPO funding valuations, and qualitative risk factors in "Basis of Issue Price" sections.

Hybrid framework elements include:

1. Quantitative layer: Adjusted CAPM incorporating CRP, liquidity risk, beta sensitivity
2. Qualitative layer: Behavioral, governance, regulatory adjustment factors
3. Scenario-based simulation: Monte Carlo or sensitivity analysis capturing valuation dispersion

Model	Factors Included	Strengths	Limitations	Suitability (IPO)
Standard CAPM	Rf, β , ERP	Simple, intuitive	Ignores CRP, liquidity	Low
Adjusted CAPM	+CRP	Captures macro/political risk	Dynamic CRP estimation	High
Fama–French 3-Factor	β , SMB, HML	Explains size/value	Needs long history	Medium
Carhart 4-Factor	β , SMB, HML, MOM	Adds momentum	Behavioral only short-term	Medium
D–CAPM	Downside β	Captures loss aversion	Data-intensive	Moderate

Table 3. Comparison of Alternative Models

6. Proposed Conceptual Framework

6.1 Framework Architecture

The proposed hybrid framework synthesizes theoretical insights, empirical evidence, and India-specific institutional realities through five sequential layers:

Layer 1: Classical CAPM Foundation Begins with standard risk-return relationship using risk-free rate, beta, and market premium (Sharpe, 1964; Lintner, 1965), serving as theoretical starting point for cost-of-equity estimation.

Layer 2: Indian Market Distortions CAPM assumptions—perfect markets, rational investors, homogenous information—fail in India's emerging market structure characterized by information asymmetry, liquidity gaps, and behavioral biases. Country-specific factors including currency volatility, inflation, and political uncertainty further distort risk-free rate and equity premium.

Layer 3: Valuation Errors in IPOs Divergence between theoretical and market-based valuations evident in Zomato and Paytm demonstrates CAPM undervalued risk, producing inflated valuations later corrected post-listing. These outcomes demonstrate inadequacy of single-factor beta for firms with limited earnings visibility and speculative participation.

Layer 4: Adjusted and Extended Models Next layer incorporates quantitative refinements: Damodaran's Adjusted CAPM adding Country Risk Premium for emerging-market volatility; Fama-French and Carhart models capturing firm-level and behavioral factors including size, value, and momentum; Estrada's Downside CAPM emphasizing loss-averse investor behavior prevalent in Indian markets. These models address CAPM's narrowness by accounting for multi-dimensional risk drivers.

Layer 5: Hybrid IPO Valuation Framework Final layer proposes integrated approach tailored for Indian IPOs blending quantitative precision with qualitative judgment: quantitative layer with cost of equity adjusted for CRP, liquidity, and downside risk; qualitative layer incorporating governance quality, promoter credibility, and sentiment analysis; regulatory layer aligning with SEBI's enhanced 2022 disclosure norms ensuring pricing transparency.

6.2 Framework Significance

The framework achieves three objectives: bridges theory and practice by adapting CAPM's elegance to Indian empirical realities through explicit country and behavioral risk embedding; improves pricing accuracy by integrating adjusted cost of equity with qualitative filters, mitigating systematic IPO overpricing; and provides regulatory and practitioner relevance complementing SEBI's evolving approach toward risk disclosure and valuation accountability.

7. Conclusion

CAPM remains a useful pedagogical starting point, but this study shows it is inadequate for valuing Indian IPOs—especially new-age, loss-making tech firms—because its core assumptions (efficient markets, homogeneous expectations, frictionless trading, and a single risk factor) break down amid India's information asymmetries, liquidity frictions, and behavioral volatility. Evidence from Zomato and Paytm illustrates how CAPM-based costs of equity ($\approx 13\text{--}15\%$) understated country and market-specific risks, contributing to IPO overpricing and subsequent corrections, whereas incorporating Damodaran's Country Risk Premium lifted equity costs to $\approx 16\text{--}18\%$ and aligned valuations more closely with realized outcomes. More broadly, a one-dimensional beta cannot capture the interplay of macro, liquidity, governance, and sentiment risks that shape primary-market pricing in emerging economies. A pragmatic path forward is a hybrid IPO valuation approach: start with an adjusted CAPM that embeds CRP and liquidity effects, complement it with multifactor or downside-risk metrics, and overlay qualitative assessments of governance and disclosure quality in line with evolving SEBI norms. Adopting this multidimensional, evidence-based process is not just analytically superior—it is essential for credible pricing, resilient portfolios, and the maturation of India's capital markets.

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