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CAPM in China: Six Decades of Theory, Empirical Evidence, and Beta Distribution Insights

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Abstract. The mention of the Capital Asset Pricing Model, raised by William Sharpe and John Lintner, has served as a fundamental theory for practitioners and measuring returns, elegantly revealing a relationship between systematic risk (beta) and expected return. While in emerging markets, especially in China's A-share market, its applicability has been under debate. This paper demonstrates CAPM's poor performance in various market conditions and the distributional characteristic of betas. By quoting data from 2016-2019, the study found that during the market stability period, the positive relationship between betas and expected returns is significant but the market volatility exerts a huge effect on the applicability of CAPM. Furthermore, according to the research on mutual funds in China, most betas cluster between 0.8 and 1.2; the others exhibit a short low-beta tail and a long high-beta tail, reflecting the retail-dominated and speculative environment of China's stock market. These findings conclude that CAPM is violated in China's stock market due to China's short market history, retail-dominated market, information asymmetry and policy-driven volatility. This research demonstrates the limitations of CAPM in emerging markets and offers guidance for investors seeking more suitable models.

Keywords: CAPM, beta distribution, China's A-share market, systematic risk, retail dominance

1. Introduction

The Capital Asset Pricing Model was introduced by John Lintner and William Sharpe over six decades ago, and it has been known as one of the most reputable and influential frameworks in modern finance. As Capital Asset Pricing Model (CAPM) has been tested in developed markets for decades, Kenneth R. French and Eugene F. Fama pointed out CAPM's poor application due to its empirical weaknesses and a flatter-than-expected security market line [1].

CAPM faces even more challenging debates in emerging markets, especially in China. China's A-share market is characterized by high volatility, policy interventions, information asymmetry and retail-dominance, which violates the core assumption of market efficiency and rational investors. Due to the empirical tests of Testing the effectiveness of CAPM in China's stock market [2], in the A-share market, the beta has a negative relationship with the expected return. While in 2016, the paper Empirical study of CAPM CSI 300 index market [3] proved that there was no clear positive relationship between the expected return and the beta, and no positive relationship between risk and

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return in A-share market. Finally, Empirical test of CAPM in Shanghai securities market [4] showed that there is a consistent implication with the CAPM model, and there is a positive relationship between the risk and the anticipated rate of return from 2016 to 2018. Many famous scholars also challenge the serviceability of CAPM in emerging markets like China.

This paper mainly investigates two issues: (1) CAPM's different performances in stable and volatile market conditions, and (2) the distributional characteristic of betas in China's A-share market. The study combines a literature review, hypothetical beta calculation using Kweichow Moutai as an example, and distributional analysis based on mutual fund data.

By providing reasons for the limitations of CAPM in China, this paper offers valuable suggestions to investors in emerging markets to seek more suitable risk management tools. It may also lay the foundation for developing a specific asset pricing model for China's A-share market.

2. History of CAPM

The Capital Asset Pricing Model (CAPM) by John Lintner and William Sharpe represents the beginning of asset pricing theory. It quantifies the association between the expected return and risk by defining systematic risk with the equation: Cost of Equity = Risk-free Rate + beta × Market Risk Premium [5]. Beta is the measure of systematic risk that can exhibit the positive relationship between expected return and risk.

A major criticism of the Capital Asset Pricing Model (CAPM) came from researchers Kenneth R. French and Eugene F. Fama, who claim that the model is an unreliable approach [6]. They discovered in a 1992 study that there is a positive relation between expected returns and risk but the relation is even weaker than the one that the model predicted originally. A typical example is that when the overall market moves upward by 10%, theoretically, individual stocks should follow with a 10% increase. However, in reality, the actual stock price growth often lags, reaching only 8% or even less.

In 2004, Eugene F. Fama and Kenneth R. French found that CAPM is "poor enough to invalidate the way it is used in applications" based on its empirical record [7]. Furthermore, they argued that other factors, such as company sizes are better at explaining the returns than beta alone.

Yet, the Capital Asset Pricing Model (CAPM) still holds some ground at present. Stephen Foerster, in his blog "Happy 60th Anniversary CAPM!" noted that "it is quite rare for research to have any relevance after ten years, let alone six" [8]. The blog also listed the reasons for its continuing existence: a diversified portfolio of investments results in unsystematic risks of different elements canceling each other out so traders only have to deal with systematic risk; the model remains very useful in evaluating mutual fund performance; and because of its straightforward and logical explanation, it is still a main topic of financial education and widely used in the industry.

3. Empirical evidence

To investigate the effectiveness of CAPM in different markets, the article titled "Empirical Test and Analysis of Capital Asset Pricing Model (CAPM) in China's Capital Market" segments the time of market stability from August 2016 to February 2018 and market volatility from February 2018 to August 2019. The findings reveal that in the period of market stability, the CAPM model explains the positive relationship of beta and expected return more evidently [9]. When there is higher market volatility, stock beta fluctuates, and the relationship seems to be not clear.

The traditional Capital Asset Pricing Model depends on a very restricted set of assumptions: all investors are rational, markets are perfect, market operations are efficient, expectations are

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homogeneous, and there is a single market portfolio. On the other hand, when compared with stock markets of developed countries, China's stock market is still not very efficient. The reasons for this situation are highlighted in The Applicability of Traditional Capital Asset Pricing Model in China's Stock Market. For example, the Chinese stock market is relatively young in comparison to the entire history of CAPM; market behavior is strongly influenced by policy changes and individual investor activities; there is a gap of information between professional investment institutions and retail participants. In fact, the trading of retail traders constitutes 80% of the total stock market transactions; the big gap in information between professional investors and retail investors doesn't align with the assumptions of the Capital Asset Pricing Model; unlike the individual investors in developed countries, who at least have some financial knowledge, most of the individual investors in China lack financial knowledge, their investing motivation are even speculative [10].

According to Xiaoyue Chen and Aijun Sun's empirical research, in China's A-share market, beta has a negative relationship with expected returns [11]. However, in 2016, research done by Hao Zhang, Juan Mou, and Yanfu Li revealed a lack of a clear positive correlation between expected return and beta and also no positive relationship between risk and return in the A-share market [3]. Last but not least, Yifan Chen, Wen Xu, Jiayi Sun, and Hui Jin's results were aligned with the CAPM model, which suggests a positive relationship between risk and expected return during 2016-2018 [4].

4. Beta distribution insights

4.1. Beta calculation example: Kweichow Moutai

In order to illustrate how to calculate beta, this study takes the stock of Kweichow Maotai as a hypothetical example. The objective is to calculate the beta of Kweichow Moutai from January 1 to January 5, related to the China Securities Index 300. Beta is defined as:

$$\beta = \frac{\text{covariance}(R_i, R_m)}{\sigma_m^2} \tag{1}$$

Where R_i refers to the daily return of Kweichow Moutai, and R_m refers to the daily return of the CSI300. Covariance shows the co-movement between Moutai and the market, briefly means how much they rise and fall together, while variance shows the market's own volatility.

Table 1. Hypothetical daily closing prices and returns for kweichow moutai and CSI 300 index (january 1–5, 2025)

Date	Moutai Closing Price	CSI 300 Index	Moutai Daily Return	CSI 300 Daily Return
1-Jan	1,000 CNY	3,000 pts	-	-
2-Jan	1,010 CNY	3,030 pts	1.00%	1.00%
3-Jan	1,005 CNY	3,015 pts	-0.50%	-0.50%
4-Jan	1,020 CNY	3,060 pts	1.49%	1.49%
5-Jan	1,015 CNY	3,045 pts	-0.49%	-0.49%

Table 1 demonstrates the hypothetical daily closing prices and returns for Kweichow Moutai and the CSI 300 Index from January 1 to January 5, 2025. It's apparent from the table that both the stock price and the market index moved in exactly the same proportion every day. For example, on January 2, Moutai rose from 1,000 to 1,010 CNY and the CSI 300 also went up from 3,000 to 3,030

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points. The same thing happened on the other days— the daily returns were identical: +1.00%, –0.50%, +1.49%, and –0.49%.

This table serves as the initial step in loading beta. The covariance and variance basically show that Moutai and CSI 300 perfectly matched each movement during these five days.

$$Moutai return on Jan 2: \frac{(1{,}010-1{,}000)}{1{,}000} = 1.00$$

$$CSI300 return on Jan 2: \frac{(3{,}030-3{,}000)}{3{,}000} = 1.00$$

Step 1: Calculate Covariance

$$\text{covariance}(R_i, R_m) = \sum_{n=1}^{n} \frac{\left(R_i - \bar{R_i}\right) \times \left(R_m - \bar{R_m}\right)}{n-1} \quad (2)$$

$$n - 1 = 4$$

$$Average return = \frac{(1.00\% - 0.50\% + 1.49\% - 0.49\%)}{4} = 0.375\%$$

Table 2. Deviation table for covariance calculation

Date	Moutai Return	Deviation	CSI 300 Return	Deviation	Deviation^2
2-Jan	1.00%	0.63%	1.00%	0.63%	0.003906
3-Jan	-0.50%	-0.88%	-0.50%	-0.88%	0.007656
4-Jan	1.49%	1.12%	1.49%	1.12%	0.012432
5-Jan	-0.49%	-0.87%	-0.49%	-0.87%	0.007482

Table 2 is the deviation table for a covariance calculation. The table records the return of Moutai and the CSI 300 for each day, their deviation from average return as well as the product of those two deviations.

Every day, the deviations for Moutai and the market are perfectly consistent with one another because their returns moved in perfect unison. We came up with 0.031476 by squaring those deviations and adding them up. Sample covariance is 0.007869 after dividing by 4.

This table is very useful as it lays out each operation in detail. As a result, the fact that Moutai tracked the market closely during these five days is very apparent. Since the deviations are a perfect match, it simplifies variance calculation.

$$Sum of Deviation^2 = 0.031476$$

$$\text{covariance}(R_i, R_m) = 0.031476 \div 4 = 0.007869$$

Step 2: Calculate Variance

Variance measures how much the CSI 300 fluctuates by itself.

$$\text{variance}(R_m) = \sum_{n=1}^{n} \frac{(R_m - \text{mean } R_m)^2}{n-1} \quad (3)$$

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$$\text{variance}(R_m) = 0.031476 \div 4 = 0.007869$$

Step 3: Calculate Beta

$$\text{Beta} = \text{Covariance}\,(R_i, R_m)/\text{Variance}\,(R_m) = 0.007869 \div 0.007869 = 1.00.$$

This means that during the hypothetical period mentioned, Kweichow Moutai daily stock prices changed exactly as the overall market. The company got an average measure of systematic risk (beta =1).

4.2. Beta distribution analysis

Beyond examples of single stock, what really can reflect the problem of China's stock market is beta's overall distribution—it's not symmetric or centered around like the assumption of CAPM, but right-skewed.

From Figure 1, we can infer from Tianshu Lyu's article On Performance and Persistence of Mutual Funds in China that most beta values are concentrated in a narrow range between 0.8 and 1.2, indicating that most stocks behave approximately in the same way as the overall market; low-beta stocks (usually with betas of 0.2–0.5) are quite rare; there are numerous high-beta stocks (with betas above 1.2, and often even exceeding 2.0).

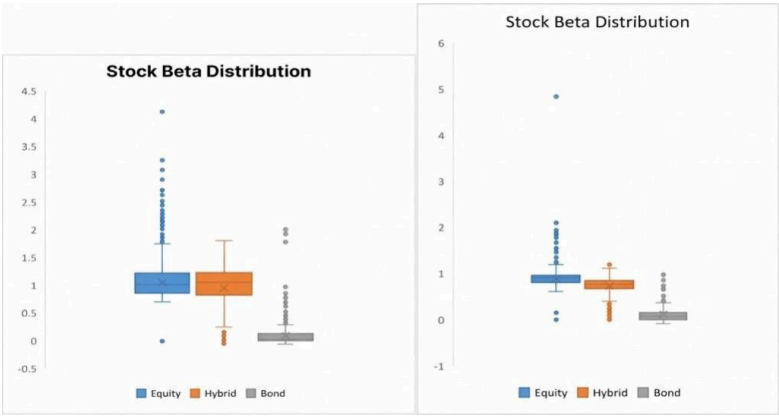


Figure 1. Fund stock beta distribution for 18-month (left) and 36-month (right)

The reasons are given. High beta stocks are stocks with a high beta coefficient, which are aggressive and strongly amplify when the market fluctuates, mainly in technology, cyclical, and growth sectors. These stocks in bull markets rise sharply, and in bear markets fall steeply, making the head stretch significantly. Retail traders are the ones making up 80% of China's stock market, and this phenomenon is caused by them chasing hot themes. Retail traders are speculative and lacks professional financial skills, so they easily become addicted to policy rumors, which create a market full of gamblers and a crowd of "me-too" stocks.

The defensive stocks, mainly in utilities and banks, are less sensitive to market movements, so they are heavily influenced by retail traders. China has fewer of them, since investors usually chase hot themes instead of stable performers. Defensive stocks have low volatility, but they are usually ignored by the market. Defensive stocks have low attention and poor liquidity, which keeps their betas low.

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5. Conclusion

To summarize, the Capital Asset Pricing Model is one of the most reliable and influential frameworks in modern finance, which effectively shows the relationship between expected returns and systematic risk, even though there are some practical limitations. Eugene F. Fama and Kenneth R. French pointed out that CAPM has been tested in developed markets for a long time, and it's a flatter-than-expected security market line. Even though there are some criticisms and competing models, CAPM works well in diversified portfolios and teaching, it has stood the test of time.

While the Capital Asset Pricing Model (CAPM) has shown considerable applicability in China's A-share market, its effectiveness diminishes during periods marked by high volatility and policy interventions, highlighting the constrained explanatory power of systematic risk. Empirical evidence shows the assumption of CAPM collapsed during market volatility periods. The short history, severe information asymmetry, policy interventions and highly speculative behaviors of retail traders, who make up 80% of China's stock market, led to the conclusion that classic CAPM cannot be applied to China's A-share market.

The right-skewed beta distribution observed in Chinese stocks and mutual funds provides additional evidence of these limitations. China's A-share market resembles a casino of retail; the majority of betas cluster tightly between 0.8 and 1.2. This means most stocks move roughly in line with the overall market; low-beta stocks (typically 0.2–0.5) are relatively rare; and high-beta stocks (above 1.2, and frequently exceeding 2.0) are abundant.

Looking ahead, future research could usefully focus on two directions. First, the development of models that suit a socialist market economy with Chinese characteristics, which can ignore retail dominance and policy intervention. Second, the use of machine-learning techniques to capture time-varying betas in policy-driven markets. Such research would not only advance academic understanding but also provide more practical tools for investors and regulators in emerging markets like China.

References

[1] Sharpe, W. F. (1964) Capital asset prices: A theory of market equilibrium under conditions of risk. The Journal of Finance, 19(3), 425–442.
[2] Chen, X., & Sun, A. (2000) Testing the effectiveness of CAPM in China's stock market. Journal of Peking University, 37(4), 28–37.
[3] Mou, J., Zhang, H., & Li, Y. (2016) Empirical study of CAPM CSI 300 index market. Journal of Applied Mathematics and Physics, 4, 661–670.
[4] Chen, Y., Sun, J., Xu, W., & Jin, H. (2019) Empirical test of CAPM in Shanghai securities market. Finance, 9(1), 28–33.
[5] Lintner, J. (1965) The valuation of risk assets and the selection of risky investments in stock portfolios and capital budgets. The Review of Economics and Statistics, 47(1), 13–37.
[6] Fama, E. F., & French, K. R. (1992) The cross-section of expected stock returns. The Journal of Finance, 47(2), 427–465.
[7] Fama, E. F., & French, K. R. (2004) The capital asset pricing model: Theory and evidence. Journal of Economic Perspectives, 18(3), 25–46.
[8] Foerster, S. R. (2024) Happy 60th anniversary CAPM! Why the Capital Asset Pricing Model still matters. CFA Institute Enterprising Investor.
[9] Zhang, J. (2024) Empirical test and analysis of capital asset pricing model (CAPM) in China's capital market. Frontiers in Business, Economics and Management, 17(3), 399–403.
[10] Chen, Z. (2022) The applicability of classic capital asset pricing model in Chinese stock market. In Proceedings of the 7th International Conference on Financial Innovation and Economic Development (ICFIED 2022), pp.622–627.
[11] Lyu, T. (2017) On performance and persistence of mutual funds in China. Bachelor's thesis, New York University Shanghai.