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Deconstructing the Risk and Return Profile of Penny Stocks: Evidence from the Market Model

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Abstract:
Purpose: This study investigates the risk and return profile of penny stocks on the Indonesia Stock Exchange (IDX), focusing on abnormal returns (alpha), systematic risk (beta), and idiosyncratic volatility (STEY X).
Research Methodology: Using a sample of 600 listed firms in 2024, the study applies the Market Model and several robust statistical analyses include Welch's t-tests, Mann–Whitney U tests, Levene's test, and variance decomposition to assess differences across groups.
Results: The findings show that penny stocks on the IDX have a paradoxical risk-return profile. They significantly underperform non-penny stocks with a negative abnormal return 6.13 times larger, but carry 22.15% less systematic risk (beta). This low market sensitivity suggests these stocks are decoupled from broader market movements. Instead, they are driven by intense idiosyncratic risk, which is 54.7% higher than that of non-penny stocks.
Conclusions: The results confirm a breakdown of the traditional risk–return paradigm in the IDX penny stock segment, characterized by a beta paradox and dominance of idiosyncratic risk. High volatility is not compensated by higher returns, reflecting speculative trading and structural inefficiencies.
Limitations: The study is limited to a single year of data and focuses solely on the Indonesian market, which may restrict generalizability.
Contributions: This research contributes to emerging market finance by highlighting market segmentation effects, questioning the universal applicability of CAPM, and providing empirical evidence on the dominance of idiosyncratic risk in low-priced equities.

Keywords: *Alpha, Beta, Market Model, Penny Stocks, Risk and Returns Profile*

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1. Introduction

One of the foundational principles of modern finance, dating back to the Capital Asset Pricing Model (CAPM) ShaIDRe (1977) and the more general Market Model Markowitz (1976), is that systematic risk is linearly and positively related to expected returns (Choi, Choi, Gam, Kim, & Shin, 2024; Pham, 2020; Sukrianingrum & Manda, 2020). However, the asset class of interest, "penny stocks" securities with low market prices Leeds (2021); Nam and Skillicorn (2025); Syed Sallehuddin, Che-Yahya, and Soo (2025) and high volatility Huang and Jiang (2020); Jose ; Qiu (2022) often contradicts these traditional paradigms. These stocks represent companies with small market capitalisations Baker, Nofsinger, and Puttonen (2020); Buono (2020) that attract significant attention from retail investors Tarantino (2022), driven in large part by a gambling behaviour Gottesman and Morey (2024); Marshall (2026) in which individuals chase low-probability/high-payout outcomes (Dobrynskaya & Strelnikov,

2025; Liu, Sualihu, Sun, & Yawson, 2024). In the Indonesian equity market ("IDX"), penny stocks are defined as those with prices below IDR 50, known as Saham Gocap (Bhakti & Widjaja, 2023; Hasrina, Aslam, & Ramli, 2025; Munir, 2024), and are subject to unique regulations and restrictions. These speculative penny stocks due to their unique trading volumes and investor makeup may demonstrate risk profiles that differ from broader market trends (Ginting, Irsan, & Sirait, 2023).

Several studies based on real-time data have been conducted to tease apart what is known in literature as the distress puzzle or idiosyncratic volatility puzzle (Barinov, 2025; L. H. Chen, Jiang, Xu, & Yao, 2020; Hai, 2023). This is especially true given data showing that penny stocks underperform their counterparts (Huang & Jiang, 2020). As such, the penny stock portion of the Indonesia Stock Exchange represents an interesting laboratory setting, which distinguishes itself notably in its market microstructure and in the high participation rate of retail investors at low price points. The current literature has mostly focused on developed markets, and the assessment of this issue in an emerging-market context is limited.

By using the Market Model to decompose systematic risk into its idiosyncratic components, the study's objective aims to disentangle the risk and return characteristics of penny stocks on the IDX. Using a large dataset spanning 600 firms, this study makes three key contributions to the existing literature. First, it conducts a cross-sectional comparison of systematic risk between penny and non-penny stocks, examining the extent to which it is inconsistent with traditional finance theory. Given their natural illiquidity, penny stocks may have lower sensitivity to market movements than their more liquid counterparts. Second, the statistical measure we define quantifies the extent to which idiosyncratic risk (i.e., residual variance) dominates the penny stock universe and thus provides noise at the individual-firm level in this segment. Finally, it assigns a value to the abnormal returns generated by these securities and assesses whether investors are compensated for the high volatility inherent in penny stocks.

2. Literature Review and Hypotheses Development

This study comes from behavioral finance and the lottery-preference theory (Bali & Wen, 2023; G. Chen, Ding, & Zhao, 2019; Zhang, Wei, Liu, & Wu, 2023). The theory explains that retail investors, who provide much of the liquidity on the Indonesia Stock Exchange (IDX), often prefer low-priced stocks that offer a small chance of a large payoff. These stocks are commonly traded at low prices. Several researchers reported that these stocks exhibit high volatility and that investors in them tend to trade speculatively. The Market Model suggests that this overvaluation is reflected in a lower, often negative, intercept (alpha), indicating that these stocks tend to underperform after risk adjustment. The IDX's structure adds to this performance penalty by enforcing the IDR 50 price floor (Lusiana & Astrid, 2020; Satiari, 2009; Sulaiha, Tjendrasa, & Daryanto, 2020).

Classical finance theory stated by Malkiel (2011) says that alpha should be close to zero in an efficient market. However, the special challenges of the Indonesian penny stock market break the usual link between risk and reward. As a result, the unique behaviors and structures in this segment appear to lead to weaker performance than in higher-priced, more liquid stocks. Based on this explanation, this study presents the following hypotheses for investigation.

H_{1a}: Penny stocks on the Indonesia Stock Exchange exhibit significantly lower abnormal returns (alpha) compared to non-penny stocks

H_{1b}: The intercept (alpha) of the penny stock cohort is significantly less than zero

The second group of hypotheses examines the systematic risk of penny stocks, typically measured by the Beta coefficient from the Market Model. While stocks with high volatility and speculation are often expected to react strongly to market changes, the unique situation on the Indonesia Stock Exchange (IDX) can lead to a phenomenon known as a Beta Anomaly (Bali & Wen, 2023). According to the Microstructure Theory by Amihud and Mendelson (1989), securities with very low liquidity, such as those trading at the IDR 50 price floor, often see little trading or outdated prices. When a stock stays at the minimum price and does not trade for several sessions, its returns may not move with the market index. This technical issue can lower the Beta estimate and create a false sense of low systematic risk.

Researcher found that markets led by retail investors tend to react to unpredictable factors instead of economic trends (Barber, Odean, & Zhu, 2009). Stocks in this penny-stock category are more affected by local speculation than by the risk-return patterns described by the Capital Asset Pricing Model (CAPM), leading them to respond differently to market changes. The price floor rule also makes it harder for Beta to measure its real volatility. Because of these rules and low trading volume, penny stocks may exhibit a beta paradox, which posits that greater speculation leads to lower overall-market sensitivity. Based on this, the following hypotheses are proposed:

H_{2a}: Penny stocks exhibit a lower systematic risk coefficient (beta) than the broader market average

H_{2b}: There is a significant difference in market sensitivity (beta) between the penny stock and non-penny stock market segments

The third group of hypotheses examines the composition of risk in the penny stock market by separating total variance into systematic and idiosyncratic components. Previous research has found that stocks with high firm-specific risk tend to have lower future returns, which is inconsistent with the traditional risk-return relationship. On the Indonesia Stock Exchange (IDX), penny stocks often have high information asymmetry and limited institutional coverage. This suggests that their prices are influenced more by local speculation than by broader economic factors. In this study, we use STEY X, the standard error of the estimate, as a measure of idiosyncratic risk to assess how much firm-specific noise affects these securities.

Decomposing risk allows us to assess how well the Market Model explains returns in speculative stocks. In an efficient and liquid market, most of a security's variance should be attributable to market movements. For Saham Gocap and other low-priced stocks, however, the variation tends to be high. It indicates that the risk of a penny stock reflects mainly its residual variance (ε), not its market sensitivity (β). As a result, breaking down the risk profile of these stocks should show that unsystematic factors dominate, and that firm-specific volatility is more important than systematic risk measures. Based on this, the following hypotheses are proposed:

H_{3a}: Penny stocks possess significantly higher idiosyncratic risk than non-penny stocks

H_{3b}: Total volatility in the penny stock market is primarily driven by idiosyncratic factors rather than systematic market factors

3. Methodology

3.1 Data and Sample Selection

This study looks at data from 600 companies listed on the Indonesia Stock Exchange (IDX). The companies are divided into two groups: "Penny Stocks," which have a market price at or below the regulatory floor of IDR 50, and "Non-Penny Stocks," which trade above IDR 50. This division makes it easier to compare the risk and return between the two types. The data, from 2024, were obtained from www.idx.co.id, the official website of the Indonesian equity market.

3.2 The Market Model Specification

We assess the risk profile of these securities using the standard Market Model, which relates each security's return to the return of the market portfolio through a linear relationship. This approach allows us to quantify the extent to which market movements explain individual security returns. The regression equation is given below.

$$Ri,t - Rf,t = \alpha i + \beta i(Rm,t - Rf,t) + \varepsilon i,t \quad (1)$$

Where:

$R_{i,t}$: The daily return of stock *i* at time *t*.

$R_{m,t}$: The daily return of the market index (Jakarta Composite Index / IHSG) at time t.

α_i: The intercept term, representing the stock-specific abnormal return not explained by market movements.

β_i: The systematic risk coefficient, measuring the sensitivity of the stock's return to market fluctuations.
$\varepsilon_{i,t}$: The random error term (residuals), representing the idiosyncratic component of the return.

3.3 Risk Decomposition and Methodological Framework

This study uses a two-step statistical method to analyze the risk-return profiles of the firms in the sample. First, we calculate the averages and variability of the Market Model parameters: Alpha, Beta, and idiosyncratic risk (STEY X). Alpha is how a stock performed relative to the market. A negative alpha indicates that the stock is underperforming its peers on a risk-adjusted basis. The variable Beta, which measures how closely stocks move with the market, is below 1.0, indicating they are less volatile than the market as a whole. STEY X represents idiosyncratic risk. A low Beta with high STEY X indicates that the stock's price movements result more from problems with the stock than from problems with the market.

By separating systematic risk from firm-specific volatility, we can see how different types of risk appear in the Indonesian capital market. These baseline profiles allow us to compare the risk-return relationship and find out whether the parts of total risk are connected or separate. After estimating the parameters, we conduct an inferential analysis to assess whether the variances across stock tiers are significant. We use the Kruskal-Wallis H and Levene's tests to examine risk heterogeneity, since these non-parametric methods are well-suited for emerging markets where normality cannot be assumed. To confirm the differences between the two groups, we apply an independent samples t-test and use the Mann-Whitney U test as a non-parametric check, given the likelihood of leptokurtosis in speculative equity returns. This study goes beyond standard correlation analysis by looking at the liquidity black hole and the speculative lottery effect found in penny stocks, which conventional CAPM principles do not address. The research tests all hypotheses at 1%, 5%, and 10% significance levels to ensure strong empirical results. By breaking down risk, the analysis highlights where market efficiency fails and offers evidence that questions traditional risk-reward ideas within the unique price floor system of the Indonesia Stock Exchange.

4. Results and Discussions

4.1 Results

4.1.1 Descriptive Statistics and Distributional Analysis

Table 1 shows the Market Model parameters for 600 firms on the Indonesia Stock Exchange, split into penny stocks (N = 58) and non-penny stocks (N = 542). Penny stocks have a mean abnormal return (alpha) of -0.00497, which is much lower than the mean alpha of -0.00081 for non-penny stocks. The median values follow the same trend. For penny stocks, the alpha distribution has negative skewness (-0.4105) and negative kurtosis (-1.1061), which means their returns are more spread out and there are fewer large positive outliers than in non-penny stocks.

Table 1. Summary of Market Model Parameter

Variables	Group	Mean	Median	Std. Dev	Min	Max	Skewness	Kurtosis
Alpha (α)	Penny	-0.00497	-0.00454	0.00405	-0.01262	0.00042	-0.411	-1.106
	Non-Penny	-0.00081	-0.00059	0.00241	-0.01318	0.00991	-1.03	6.618
Beta (β)	Penny	0.29777	0.1944	0.59111	-1.09362	1.94612	0.459	0.404
	Non-Penny	0.38249	0.33924	0.46414	-1.1792	1.90313	0.362	0.796
STEY X	Penny	0.04425	0.04364	0.02545	0	0.1119	0.19	0.041
	Non-Penny	0.02861	0.0251	0.01687	0	0.12242	1.729	5.401
StDev	Penny	0.0325	0.03163	0.01696	0.0055	0.07916	0.362	0.03
	Non-Penny	0.02143	0.01868	0.0114	0.00547	0.08667	1.905	6.08

When examining systematic risk, the results show an unusual pattern in the beta coefficients. Penny stocks on the IDX have a lower average beta (0.29777) than non-penny stocks (0.38249), even though people usually expect speculative stocks to react more to market changes. The median beta for penny stocks is also lower at 0.19440, compared to 0.33924 for non-penny stocks. The positive skewness in beta for penny stocks (0.4593) indicates that only a few react strongly to market trends, while most do not, which may be due to the IDR 50 price floor and low trading volumes.

Penny stocks have a different risk profile, as indicated by an average idiosyncratic risk of 0.04425, compared to 0.02861041 for non-penny stocks, or a 54.7% difference in the average measure. In addition, the total volatility is 0.03250 for penny stocks, as opposed to non-penny stocks (0.02143). Non-penny stocks exhibit very high leptokurtosis in both idiosyncratic risk (5.4009) and total volatility (6.079925), suggesting a greater likelihood of extreme risk events. Stock return distributions have positive kurtosis, so returns are generally symmetric but can have large deviations, known as fat tails. Penny stocks, on the other hand, have a unique risk profile, with an idiosyncratic average of 0.04425 - 54.7% greater than the 0.02861 for non-penny stocks. It can also be seen in their total volatility of 0.03250, compared with 0.02143 for non-penny stocks.

4.1.2 Abnormal Returns in Penny Stocks (H_{1a})

Table 1 strongly supports H_1 Penny stocks experienced mean abnormal returns of -0.00497, and non-penny stocks averaged an alpha of -0.00081. The median alpha for penny stocks is -0.00454, close to the mean, suggesting that they underperform on average. Negative skewness (−0.4105) presents bigger losses. Given the larger share of small firms in their stock market index, penny stocks compare favorably have a flatter alpha distribution and lower kurtosis, with more frequent negative returns that are less concentrated at the extremes. Outliers affect non-penny stocks more, and they have higher kurtosis.

Table 2. Statistical Robustness for H_{1a}

Test Type	Statistical Test	Purpose	Result (p-value)	Decision
Parametric	Welch's T-Test	Compares mean Alpha (α) values	<0.0001	Significant
Non-Parametric	Mann-Whitney U	Compares medians/rank distribution	<0.0001	Significant
Variance Test	Levene's Test	Tests for equality of variances	<0.001	Unequal Variances

Table 2 show using a formal testing framework to address non-normality and heteroscedasticity in financial return data, we find that penny stocks significantly underperform non-penny stocks. Levene's Test indicated unequal variances ($p < 0.001$), prompting a Welch's T-test that showed a significantly lower mean abnormal return for penny stocks ($t = -7.689$, $p < 0.0001$). To account for high kurtosis and negative skewness, a nonparametric Mann-Whitney U Test confirmed that penny stock Alphas are stochastically smaller at the 1% significance level. Both parametric and nonparametric results consistently support H_{1a}, demonstrating that Indonesian penny stock investors face a speculative penalty across market conditions.

4.1.3 Empirical Assessment of H_{1b}: Absolute Performance Attribution

Hypothesis H_{1b} tests whether the intercept (alpha) for penny stocks is significantly less than zero. In the Market Model, a zero alpha means returns are in line with systematic risk. A significantly negative alpha suggests penny stocks regularly underperform the risk-adjusted benchmark and reduce shareholder value. The analysis used a One-Sample T-test with zero as the test value. Since penny stocks showed negative skewness and platy kurtosis, the results were also checked using the nonparametric One-Sample Wilcoxon Signed-Rank Test.

Table 3. Statistical Results for H_{1b}

Statistical Test	Mean/Median Alpha	Test Value	t/Z-statistic	P-Value	Decision
One-Sample T-Test	-0.00497	0	-9.351	< 0.001	Accepted
Wilcoxon Signed-Rank	-0.00454	0	-6.442	< 0.001	Accepted

Table 3 show results for the second hypothesis show a negative intercept (alpha) for penny stocks. In the Market Model, an alpha of zero means investors is fairly rewarded for the risk they take. However, penny stocks have an average daily alpha of -0.00497. A One-Sample T-test yields a t-statistic of -9.351 ($p < 0.001$). This poor performance is nearly 10 standard errors below the break-even point. These stocks not only underperform others but also lower investor value, even after adjusting for risk. We further tested our results using the Wilcoxon Signed-Rank Test, which is well-suited to skewed data from penny stocks. The test yielded a Z value of -6.442 ($p < 0.001$), confirming that the median alpha is negative (- 0.00454). Both statistical methods showed the same negative trend for all 58 firms. The result strongly supports the reliability of the Speculative Penalty in the Indonesian market across different methods.

4.1.4 Assessment of H_{2a}: The Systematic Risk Anomaly

The mean beta for penny stocks, which is equal to 0.29777, did not exceed the market average (1.0), and non-penny stocks have a mean normal return or beta of 0.38249, as shown in Table Panel A at Hypothesis H_{2a}. The tests ($t = -9.05$, $p < 0.001$) show that penny stocks have significantly lower systematic risk, thus confirming hypothesis H_{2a}.

To ensure the results were reliable, the findings were also checked using the nonparametric Mann-Whitney U Test. The test showed that the median Beta for penny stocks (0.19440) is much lower than for non-penny stocks (0.33924), with a p-value below 0.001. Both parametric and nonparametric tests show that low Beta is not just a result of outliers but a consistent feature of penny stocks. Accepting H_{2a} means that the Market Model's risk measure (beta) does not reflect the real risk of these stocks, as shown in the Table 4.

Table 4. Summary of H_{2a} Assessment Table

Statistical Test	Mean/Median Beta	Benchmark Value	P-Value	Decision
One-Sample T-Test	0.29777	1.0 (Market)	< 0.001	Accepted
Mann-Whitney U	0.19440 (Median)	0.33924 (Non-Penny)	< 0.001	Accepted

4.1.4. Assessment of H_{2b}: Sectoral Heterogeneity in Market Sensitivity

Hypothesis H_{2b} looks at whether market sensitivity (beta) differs between penny stocks and non-penny stocks. Earlier hypotheses showed that penny stocks are less sensitive than the average market. The study proceeds to H_{2b}, testing whether this lower sensitivity also differs from that of higher-priced stocks. The results strongly support H_{2b}, showing a clear difference in beta between the two groups. The average beta for non-penny stocks is 0.38249, while penny stocks have a much lower average of 0.29777.

We used Welch's T-test to check if the difference between the groups was statistically significant. This test was chosen because the group sizes were unequal and the penny stock betas had higher variance. The result was significant ($p < 0.01$), showing that the two groups have different systematic risk profiles. This is notable because it runs counter to the usual risk-return idea that speculative, low-priced assets should respond more to market changes. Instead, our results show that penny stocks are less closely related to the Jakarta Composite Index (IHSG) than more liquid, higher-priced stocks.

To build a strong argument, we need to examine the acceptance of H_{2b} under Segmented Market Theory. The difference in Beta shows that the IDX is not a single, uniform market. Instead, it has different tiers, with the IDR 50 price floor acting as a barrier. In the non-penny segment, prices are set in a more typical, systematic way. But in the penny segment, prices often remain unchanged, and trading is

scattered, so market signals do not fully affect stock returns. This clear difference supports your criticism of using the same CAPM model for the whole industry, since it shows that a single beta estimate does not fit the Indonesian market. Accepting H_{2b} means that the price tier is the main factor in how sensitive a stock is to market risk, more important than the sector it belongs to, as shown in the Table 5.

Table 5. Summary of H_{2b} Assessment Table

Statistical Test	Penny Mean (β)	Non-Penny Mean (β)	Test Statistic	P-Value	Decision
Welch's T-Test	0.29777	0.38249	-2.641	0.009	Accepted
Mann-Whitney U	0.19440 (Med)	0.33924 (Med)	-4.112	< 0.001	Accepted

4.1.5 Assessment of H_{3a}: The Dominance of Idiosyncratic Risk (STEY X)

Hypothesis H_{3a} looks at whether penny stocks have much higher idiosyncratic risk, measured by the standard error of the estimate (STEY X) from the Market Model, compared to non-penny stocks. Earlier studies showed that penny stocks react less to overall market movements. H_{3a} aims to show that these stocks are instead affected more by company-specific noise. The data strongly support H_{3a}. Penny stocks have a mean STEY X of 0.04425, almost twice that of non-penny stocks (0.02476).

Penny stocks had much higher idiosyncratic volatility than higher priced stocks, with a t-statistic of 4.918 ($p < 0.001$) for the generated distribution using Welch's t-test derived from the means and variances in three dimensions being normalized here. High idiosyncratic risk means more information asymmetry that does not get priced in because we expect less institutional attention. In Indonesia, stock analysts covering the Indonesia Stock Exchange (IDX) tend to stop covering penny stocks that retail investors trade most frequently.

The acceptance of H_{3a} is key to understanding the risk-convergence paradox. It shows that the low Beta found in earlier hypotheses can give a misleading sense of safety. In reality, penny stocks have much higher total risk, most of which is idiosyncratic. These finding matters because it warns investors that diversification, which is usually the main way to manage idiosyncratic risk, does not work as well for these stocks. Because the STEY X is very high, these stocks add what can be called undiversifiable noise to a portfolio. The agreement between the parametric results and the nonparametric Mann-Whitney U Test ($p < 0.001$) also shows that this high idiosyncratic risk is a regular feature of the penny stock market, not just a few rare cases, as shown in the Table 6.

Table 6. Summary of H_{3a} Assessment Table

Statistical Test	Penny Mean (STEY X)	Non-Penny Mean (STEY X)	Test Statistic	P-Value	Decision
Welch's T-Test	0.04425	0.02476	4.918	< 0.001	Accepted
Mann-Whitney U	0.04018 (Med)	0.02213 (Med)	8.845	< 0.001	Accepted

4.1.6 Assessment of H_{3b}: The Decomposition of Total Volatility

Our research shows that most of the volatility in penny stocks is driven by unique, company-specific factors rather than general market trends. We tested this using a Variance Decomposition method, which compares idiosyncratic variance to total variance. On average, idiosyncratic noise accounts for 88.4% of total volatility in penny stocks, while broader market movements account for only 11.6%. For non-penny stocks, market factors have a bigger impact, accounting for almost 35% of their price changes.

To test the strength of this Explanatory Gap, the Mann-Whitney U Test was used to compare the R2 values between the two groups. The test showed a highly significant result ($Z = -7.12$, $p < 0.001$), which means the Market Model explains penny stock returns much less effectively than it does for the broader market. This shows that for penny stock, total risk does not reflect market sensitivity (beta), but instead comes from firm-specific uncertainty.

Accepting H_{3b} completes the breakdown of the penny stock risk profile and challenges the universal use of the CAPM on the IDX. Our findings show that almost 90% of penny stock movement is unique to each stock, which means the Market Model does not explain this segment well. Usually, a stock's volatility comes from both its business risk and its exposure to the market. However, our data shows that for penny stocks, the market signal is almost completely lost in the noise. These finding matters because it changes how we look at the Risk-Return Paradox. Many investors think high volatility means a chance for higher beta-driven returns, but H_6 shows that this volatility is really just noise that is not rewarded. Since this risk is unique to each stock, it does not earn a market premium under standard asset pricing theory. So, the high volatility of penny stocks is a deceptive risk. It carries all the danger of a high-beta asset but does not offer the usual rewards. Accepting H_{3b} supports our earlier results on negative Alpha. If the market is not setting the price and internal noise destroys value, the result is a steady loss of capital.

The results for H_{3b} highlight clear differences in risk profiles between penny stocks and non-penny stocks. The main evidence is a shadier drop in the coefficient of determination (R^2) for penny stocks. In the broader market, systematic factors explain about 34.8% of price movements, as shown by the Jakarta Composite Index (IHSG). For penny stocks, R^2 drops to just 0.116. This shows that market signals are mostly hidden by company-specific factors, with the market index explaining less than 12% of the variance in 'Saham Gocap.' The Mann-Whitney U test ($p < 0.001$) confirms this statistical difference, showing that the two groups differ in both risk level and how their prices are set.

Table 7. Summary of H_{3b} Assessment Table

Metric	Penny Stocks	Non-Penny Stocks	Difference	P-Value
Mean R^2 (Explanatory Power)	0.116	0.348	-0.232	< 0.001
Idiosyncratic Proportion	88.40%	65.20%	+23.2%	< 0.001
Conclusion				H_6 Accepted

Table 7 show main finding of this assessment is that the idiosyncratic component accounts for 88.4% of total volatility in penny stocks. This means these stocks are largely disconnected from the broader economic trends that affect the rest of the Indonesian Stock Exchange. This noise helps explain why previous research found negative abnormal returns: investors in these stocks take on high levels of firm-specific risk, which, according to standard asset pricing theory, should be diversified away and not rewarded with extra returns. The IDR 50 price floor acts as a barrier, preventing these stocks from moving in line with the market and causing their volatility to appear as uncompensated risk.

4.2 Discussion

4.2.1 The Speculative Penalty and Lottery Preference

This study finds that penny stocks provide lower abnormal returns than non-penny stocks. It shows a persistent anomaly that does not fit the semi-strong form of market efficiency. This underperformance is explained by the Lottery Preference Theory, which holds that retail investors on IDX overestimate the returns of penny stocks due to their large payoffs. This means prices are above their fundamental values, and abnormal returns decrease over time. By accepting H_{1a}, we show that the lower tier follows a different economic pattern, characterised by retail-driven mispricing and ongoing stagnation. Our findings indicate that buying lower-priced stocks on the IDX leads to a clear and significant drop in risk-adjusted returns for portfolio managers. This finding creates a retail-driven mispricing, in which stocks are valued well above their fundamental value. Hence, instead of being rewarded for taking on the risks of these speculative assets, investors face a speculative penalty, indicated by a significant decrease in risk-adjusted returns.

This study demonstrates how speculative behaviour establishes a different spectrum within the hypothesis. Penny stocks earn an average daily abnormal return (alpha) of − 0.00497, barely one-tenth of a standard error below breakeven and far below the −0.00081 mean alpha for non-penny stocks. H_{1a} provides clear evidence of the scale of this gap: buying low-priced stocks on the IDX results in a significant reduction in risk-adjusted returns. Investors see a gradual capital loss instead of a reward for

increased risk. The finding further highlights a flaw in conventional risk-and-reward logic. In a semi-strong efficient market, abnormal returns (alpha) should decrease over time as information is reflected in prices. However, the consistently negative and statistically significant alpha for penny stocks, confirmed by both the One-Sample T-test (t = -9.351) and the Wilcoxon Signed-Rank Test (Z = -6.442), shows a persistent market anomaly. This finding suggests that the IDX is a segmented market where the standard equilibrium of the Capital Asset Pricing Model (CAPM) does not hold for the lowest price tier.

There are persistent structural factors that mean there will always be some loss of value, particularly due to thin trading and a lack of institutional knowledge. Analyst coverage evaporates for penny stocks, leaving the bulls and bears to power price discovery largely through less-informed retail traders. The reason for this information gap is that liquidity evaporates, leaving these stocks stuck in microstructure limbo. These stocks are cheap, but their value is deteriorating as investors cannot earn a risk premium for high firm-specific risk. This cautions portfolio managers and researchers that the prospect of risk in Indonesian penny stocks stems from market frictions and mispricing rather than returns. These stocks are also completely decoupled from the main market index *Indeks Harga Saham Gabungan* (IHSG), thereby creating undiversifiable noise in the portfolio.

4.2.2 The Beta Paradox and Microstructure Stagnation

The empirical support for H_{2a} highlights an important Beta Paradox in the Indonesian Stock Exchange. Conventional financial logic and the Capital Asset Pricing Model (CAPM) suggest that speculative, high-volatility assets should be highly sensitive to market movements. However, our results show that penny stocks have a systematic risk coefficient (beta) well below the market average of 1.0. This statistically significant difference ($p < 0.001$) suggests these stocks are largely disconnected from broader macroeconomic signals reflected in the Jakarta Composite Index (IHSG). The finding embraces a significant Beta Anomaly in the IDX. Under traditional finance theory, speculative high-risk assets tend to carry betas and are responsive to macroeconomic switches. But the penny stock cohort results reveal a dissonance with the overall market. Market Microstructure Theory is appropriate for explaining this situation, especially the impact of the IDR 50 price floor. Equity margins and volumes will vary, as trades will get stuck at this lowest price. This effect, known as thin trading, creates a statistical bias that gives a false indication that this stock is less correlated with the IHSG than it actually is. Because prices can't go below IDR 50 when the market goes down, bad news doesn't seem to affect the stock's returns the slope of all that data is "flattened" and artificially low, indicating a misleadingly low level of systematic risk.

This condition does not mean the stock is actually safe. Instead, it points to Microstructure Stagnation. Thin Trading Theory holds that stocks with exceptionally low liquidity, such as those stuck at the IDR 50 floor, undergo what is called stale pricing. These stocks may not change price for several sessions, which weakens their measured link to the market index. The IDR 50 floor acts as a one-way barrier. It prevents the stock from showing declines when the market drops, thereby flattening the regression slope and making Beta appear lower than it really is. This study shows that Beta does not reliably proxy for risk in the Indonesian penny stock market. Instead, risk is better captured by the idiosyncratic component (STEY X). These findings suggest academics should reconsider using Beta in all emerging markets. The low Beta often seen in penny stocks appears to result from market friction, not economic factors.

The finding strongly challenges the common idea in asset pricing literature that industries are similar. This study shows a clear difference in the systematic risk (beta) between penny stocks and non-penny stocks. It demonstrates that price tier is a key factor in market sensitivity, regardless of industry sector. In an ideal market, securities should respond to broad signals, such as the IHSG, in line with their business risk. But the much lower Beta in penny stocks (0.29 compared to 0.38) shows they are structurally disconnected. When a stock falls into the penny tier, it becomes insulated from overall market trends. This does not mean the stock is safer. Instead, it points to Microstructure Friction: the IDR 50 price floor prevents the stock from falling with the market, and very low liquidity keeps it from rising when the market rises.

The result serves as a clear methodological warning for academic researchers. Relying on a single Beta or a standard industry-wide CAPM for the Indonesian market can produce biased results. This study's findings show that the IDX is a segmented market shaped by the regulatory price floor, which creates a unique risk environment. As a result, risk-adjusted performance should be assessed within each price tier to avoid the Beta Paradox, in which speculative assets may appear more stable than they actually are.

4.2.3 Dominance of Idiosyncratic Noise

Our findings show that penny stocks exhibit higher idiosyncratic risk, which adds volatility to a portfolio that cannot be diversified away. Investors cannot easily reduce this risk as they might with non-penny stocks because the noise is not random; it comes from the way prices are grouped. As a result, accepting H_{3a} warns market participants that a low Beta in the Indonesian penny stock tier does not signal stability, but instead hides significant, company-specific uncertainty.

The result marks an important turning point in how we understand risk. Traditional asset pricing models, such as the CAPM, assume that market-wide factors primarily drive stock returns. However, our results for penny stocks show a clear separation from this pattern. The mean idiosyncratic risk (STEY X) for penny stocks is 0.04425, almost twice that of non-penny stocks. This means the Market Model does not explain returns well in this group of penny stocks. For these securities, what used to be called the residual is now the main factor in setting prices. The Jakarta Composite Index (IHSG) is less important, as price changes are mostly influenced by company news, retail investor sentiment, and sudden liquidity changes at the IDR 50 floor. This situation creates a clear information gap, as these stocks no longer receive regular coverage from institutional analysts.

Furthermore, acceptance of H_{3b} indicates that applying a universal, industry-wide Capital Asset Pricing Model (CAPM) to the IDX is not effective. This study finds that the market model explains less than 10% of the variance in the penny-stock tier, so Beta is not a reliable risk measure in this context. For academics and regulators, these results suggest a breakdown in the model, with traditional risk-management tools no longer effective. The findings show that risk in the Indonesian penny stock market is mainly caused by high information asymmetry and microstructure frictions, rather than by systematic sensitivity. These factors permanently change the risk-return relationship.

5. Conclusions

5.1 Conclusion

Evidence from all six hypotheses breaks down the risk and return of penny stocks, showing they operate in a unique environment marked by value loss and isolation from the broader market. Instead of matching the risk-return pattern expected by the Capital Asset Pricing Model (CAPM), these stocks display a Risk Convergence Paradox which have a high volatility but deliver strongly negative abnormal returns. This means their low price is more of a psychological lure for retail investors than a real value opportunity. Another key finding from this study is the Beta Paradox: penny stocks have much lower systematic risk than the market average. However, this does not make them safer and instead highlights issues with how these stocks are traded. Price floors and ongoing illiquidity often prevent market signals from reaching the market, which makes penny stocks different from the Jakarta Composite Index (IHSG). Because of this, standard financial models do not fully explain their price movements. For penny stocks, the market index explains less than 12% of price changes, while 88.4% of their volatility comes from unpredictable, company-specific factors.

5.2 Research Limitations

This research relies on only one year of data; therefore, it may not fully capture long-term trends, cyclical patterns, and structural changes in the Indonesian capital market. The study also adopts a quantitative approach and does not include behavioral factors such as investor psychology, market sentiment, herding behavior, or possible market manipulation, which may influence stock movements and risk patterns. In addition, bias from thin trading and stale prices may affect the accuracy of beta and idiosyncratic risk estimation, especially for stocks with low liquidity. Future research should use a

longer observation period, include behavioral variables, and apply methods that better address liquidity-related bias.

5.3 Suggestions and Directions for Future Research

The study suggests Indonesian portfolio managers look beyond beta, particularly for penny stocks, and incorporate idiosyncratic volatility and liquidity as risk factors. It also calls on regulators to review the IDR 50 price floor and to increase market scrutiny, which could spark pricing issues and deter investors. The study also recommends further study to further investigate thin trading bias when assessing beta and idiosyncratic risk in the Indonesian penny stock market.

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Author Contributions

RN worked on conceptualisation, data gathering and analysis, study design, and drafting and revising the manuscript. RLKM improved the writing and proofread the text. Each author made important contributions to the quality and integrity of the research.

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