Simen Owen Academic Proceedings Series

Vol. 2 2025

Article Open Access

Comovement in the Chinese CSI 300 Index

Bohan Wang [1,*]

[1] School of Economics, Capital University of Economics and Business, Beijing, 100026, China
* Correspondence: Bohan Wang, School of Economics, Capital University of Economics and Business, Beijing, 100026, China

Abstract: This study examines whether comovement exists in the Chinese stock market by investigating the relationship between individual stock returns and the CSI 300 Index. Using both univariate and bivariate regression analyses, we test the changes in beta coefficients and R-squared values when a stock is added to or removed from the CSI 300 Index. The empirical results indicate that the overall change in these parameters is statistically insignificant. To further explore this phenomenon, we analyze the potential influence of index arbitrageurs on comovement. The findings remain robust even after accounting for the mean reversion of beta. Therefore, the results provide strong evidence that comovement in the Chinese stock market is statistically significant.

Keywords: comovement; Chinese stock market; CSI 300 Index; beta; index arbitrage; mean reversion

Received: 04 October 2025
Revised: 18 October 2025
Accepted: 11 November 2025
Published: 23 November 2025

1. Introduction

According to classical financial theory, price fluctuations should be driven solely by new information affecting expected cash flows and discount rates. However, later theoretical models suggest that style investing, based on non-fundamental factors, also plays a crucial role in asset price movements. Specifically, while classical theory asserts that asset prices move together due to common factors influencing fundamentals, these models argue that prices may comove because investors switch their preferences across styles, a behavior unrelated to fundamental values.

A substantial body of empirical research supports this argument. Earlier studies find that when stocks are added to the S&P 500 Index, their betas tend to be overestimated, whereas deletions lead to underestimated betas. Other analyses observe that a stock's beta increases upon inclusion in the S&P 500, and that the index beta also rises in bivariate regression analyses. Research on the FTSE 100 reports that when a stock is added, its comovement with the index strengthens, while deletions produce the opposite effect. Studies on the Nikkei 225 suggest that the degree of beta overestimation is positively correlated with comovement among stocks included in the index and negatively correlated with those excluded. Further evidence indicates that split stocks exhibit higher comovement with lower-priced stocks and lower comovement with higher-priced ones, and that excessive comovement occurs between stock returns and the S&P 500 following inclusions but weakens after deletions. Other findings show that inclusion in a major index increases the proportion of market return variance explained by beta, as well as turnover rates and analyst coverage. More recent analyses reveal that overall beta increases are driven by the inclusion of low-beta stocks and that the trading activities of arbitrageurs exert a significant influence on these changes, based on data from the S&P 500 Index.

In this paper, we extend prior research by examining the comovement phenomenon in the Chinese stock market using CSI 300 data at daily, weekly, and monthly frequencies.

First, we test the prediction that both the slope coefficient (beta) and R-squared increase when a stock is added to an index and decrease when it is deleted. Using CSI 300 data, we find that at the daily frequency, beta and R-squared values estimated through univariate regression decrease by 0.035 and 0.031, respectively, after deletions, both significant at the 1% level. This finding is consistent with earlier results. However, we observe that the increase following additions is statistically insignificant. We attribute this to short selling of high-beta additions by arbitrageurs.

Our second contribution is to analyze how low-beta and high-beta stocks affect overall comovement changes. We divide the sample into two groups-high-beta and low-beta stocks-and examine the changes in beta and R-squared for each. The results show that, at the daily frequency, when a stock is added, beta increases by 0.212 for low-beta stocks and decreases by 0.212 for high-beta stocks, both significant at the 1% level. Similarly, R-squared increases by 0.144 for low-beta stocks and by 0.077 for high-beta stocks. These findings indicate that the beta of high-beta stocks declines significantly, while that of low-beta stocks rises significantly, causing the effects to offset each other and resulting in an overall insignificant change in comovement.

Our third contribution considers the effect of nonstationary betas. Previous studies often assume beta to be stationary; however, later research proposes that beta reverts to its mean value over time. After adjusting for mean reversion, we find that the results remain significant. At the daily frequency, for additions, beta increases by 0.108 for low-beta stocks and decreases by 0.097 for high-beta stocks, as estimated through univariate regression.

The remainder of this paper is organized as follows. Section 2 presents the data and methodology. Section 3 discusses the results. Section 4 provides robustness tests. Section 5 concludes the study.

2. Data and Methodology

2.1. Data

We examine changes in comovement surrounding CSI 300 index inclusions and deletions at daily, weekly, and monthly frequencies from June 2006 to June 2024. In the study, there are 838 inclusion events and 838 deletion events. If an event occurs too close to the end of the sample period and the data required to calculate post-event betas are unavailable, the event is excluded. Consequently, there are 823, 823, and 822 inclusion events in the daily, weekly, and monthly samples, respectively. For deletion events, the sample contains 821, 820, and 825 observations for daily, weekly, and monthly data, respectively.

We collect return rates of the event stocks, as well as return rates and market capitalizations of the CSI 300 Index and the CSI All Share Index, at daily, weekly, and monthly frequencies from the CSMAR database. Daily and weekly data cover the period from June 2004 to June 2025, while monthly data span from June 2002 to June 2025.

2.2. Methodology

Previous studies predict that both the slope coefficient of index return and the R-squared of an OLS regression increase when an event stock is added to an index and decrease when an event stock is deleted. To test whether this prediction holds in the Chinese market, we employ a univariate regression framework. Specifically, we examine whether the slope coefficient of CSI 300 index return and the R-squared of the OLS regression are higher for stocks added to the index and lower for stocks deleted from the index. The univariate regression model is specified as follows:

$$R_{j,t} = \beta_j + \beta_j R_{CSI300,t} + e_{j,t}$$

Where $R_{j,t}$ is the return of stock j at time t, $R_{CSI300,t}$ is the return of CSI300 at time t, $e_{j,t}$ is residual error.

To measure the average change in slope coefficient and R^2 we estimate the value of beta and R^2 before and after events then calculate the difference using daily, weekly, and monthly data, respectively. We run the regression over the one-year period before and after the event for daily and weekly data. And for monthly data, data over the 36-month period is used before and after the event. The difference in values of beta and R^2 between after the event and before the event is used to measure the change in comovement.

In the next step, we measure the change in loading of event stock on the CSI300 return and the change in comovement between event stock and nonCSI300. We use the following bivariate model to test the value of slope coefficient with CSI300 index return and that with non-CSI300 index return, respectively:

$$R_{j,t} = \beta_j + \beta_{j,CSI300} R_{CSI300,t} + \beta_{j,nonCSI300} R_{nonCSI300,t} + e_{j,t}$$

Where $R_{j,t}$ is the return of stock j at time t, $R_{CSI300,t}$ is the return of CSI300 at time t, $R_{nonCSI300,t}$ is the return of nonCSI300 at time t, $e_{j,t}$ is residual error.

$\mathrm{R_{nonCSI300,t}}$ is calculated through following formula:

$$R_{nonCSI300,t} = \frac{R_{Ashare,t} - weight_{CSI300,t-1} \times R_{CSI300,t}}{weight_{nonCSI300,t-1}}$$

$$mv_{nonCSI300,t} = mv_{Ashare,t} - mv_{CSI300,t}$$

$$weight_{CSI300,t} = \frac{mv_{CSI300,t}}{mv_{Ashare,t}}$$

$$weight_{nonCSI300,t} = \frac{mv_{nonCSI300,t}}{mv_{Ashare,t}}$$

Where $R_{Ashare,t}$ denotes value-weighted average return on A-share stocks at time t,$mv_{CSI300,t}$ is market capitalization of the CSI 300 index at time t, $mv_{Ashare,t}$ is market capitalization of A-share stocks at time t.

Similarly, we estimate the value of beta before and after events using daily and weekly data over one-year period before and after the event. For monthly data, data over 36-month period is used before and after the event.

3. Results

As shown in Table 1, the changes in beta and R² estimated by the univariate model after stock additions and deletions are reported at daily, weekly, and monthly frequencies. The table also reports changes in CSI300 beta and non-CSI300 beta estimated by the bivariate model.

Table 1. Changes in Beta and R² for CSI 300 Index Additions and Deletions at Daily, Weekly, and Monthly Frequencies.

Sample	Univariate			Bivariate		
	N	$\overline{\Delta\boldsymbol{\beta}}$**(s.e.)**	$\overline{\Delta\boldsymbol{R^2}}$**(s.e.)**	**N**	$\overline{\Delta\boldsymbol{\beta}_{CSI300}}$**(s.e.)**	$\overline{\Delta\boldsymbol{\beta}_{nonCSI300}}$**(s.e.)**
$Panel\ A$: $daily\ return$						
Additions	823	-0.016 (0.018)	0.108*** (0.007)	703	0.132*** (0.023)	-0.143*** (0.017)
Deletions	821	-0.035*** (0.012)	-0.031*** (0.007)	694	-0.017 (0.015)	0.036*** (0.010)
$Panel\ B$: $weekly\ retu$						
Additions	823	-0.017 (0.046)	0.062*** (0.008)	703	-0.076 (0.076)	0.013 (0.056)
Deletions	820	-0.004 (0.025)	-0.005 (0.009)	693	-0.054** (0.031)	0.047*** (0.015)
$Panel\ C$: $monthly\ ret$						
Additions	822	-0.051 (0.118)	0.063*** (0.010)	701	0.270* (0.201)	-0.095 (0.200)

Deletions	825	-0.088*** (0.036)	-0.027*** (0.009)	696	-0.036 (0.121)	0.016 (0.082)

At the daily frequency, for additions, the increase in R^2 is 0.108, which is significant at the 1% level in univariate regression. However, the change in beta is negative, although insignificant. This may be explained by the offsetting effects of low-beta and high-beta stocks. Specifically, pre-event low-beta stocks lead to a beta increase due to common demand, while post-event high-beta stocks reduce the beta increase driven by index trackers. Table 1 also shows that in bivariate regression, CSI300 beta increases by 0.132, and non-CSI300 beta decreases by 0.143, both significant. This indicates that the beta change is more pronounced after controlling for the return on non-index shares. For deletions, univariate regression shows a decrease in beta of -0.035 and a decrease in R^2 of -0.031, both significant. In bivariate regression, non-CSI300 beta increases by 0.036 at the 1% significance level, while the change in CSI300 beta is negative but insignificant.

The weekly results exhibit similar patterns. For additions, R^2 increases by 0.062 in univariate regression, which is significant, while the change in beta is negative but insignificant. In bivariate regression, CSI300 beta decreases and non-CSI300 beta increases when a stock is added, reflecting offsetting effects between high-beta and low-beta stocks. For deletions, univariate regression shows a decrease in beta of -0.004 and a decrease in R^2 of -0.005, consistent in tendency with predictions, though not significant. In bivariate regression, CSI300 beta decreases by 0.054, and non-CSI300 beta increases by 0.047.

At the monthly frequency, for additions, R^2 increases by 0.063 and is significant in univariate regression, while beta decreases insignificantly. In bivariate regression, CSI300 beta increases by 0.270, significant, while non-CSI300 beta decreases insignificantly. For deletions, univariate regression shows a decrease in beta of -0.088 and a decrease in R^2 of -0.027. In bivariate regression, CSI300 beta decreases by -0.036, and non-CSI300 beta increases by 0.016, following the same tendency as predicted but not significant.

In summary, the univariate regression results for additions are generally insignificant or negative, which may be attributed to index arbitrageurs who long low-beta stocks and short high-beta stocks. To further examine this effect, we separate stocks into high-beta and low-beta groups and report their results in Table 2.

Table 2. Changes in Beta and R^2 for High-Beta and Low-Beta Stocks in CSI 300 Index Additions and Deletions at Daily, Weekly, and Monthly Frequencies.

sample	**univariate**			**bivariate**		
	N	$\overline{\Delta\boldsymbol{\beta}}$**(s.e.)**	$\overline{\Delta\boldsymbol{R^2}}$**(s.e.)**	**N**	$\overline{\Delta\boldsymbol{\beta}_{CSI300}}$**(s.e.)**	$\overline{\Delta\boldsymbol{\beta}_{nonCSI300}}$**(s.e.)**
Panel A: *daily retur*						
Additions						
High beta	442	-0.212*** (0.022)	0.077*** (0.010)	244	-0.229*** (0.028)	-0.035* (0.026)
Low beta	381	0.212*** (0.025)	0.144*** (0.010)	459	0.323*** (0.027)	-0.201*** (0.021)
Deletions						
High beta	449	-0.134*** (0.015)	-0.071*** (0.009)	206	-0.205*** (0.025)	0.083*** (0.016)
Low beta	372	0.085*** (0.017)	0.017* (0.011)	488	0.062*** (0.017)	0.016 (0.013)
Panel B: *weekly ret*						
Additions						

High beta	250	-0.814*** (0.117)	-0.043*** (0.016)	256	-0.779*** (0.191)	0.072 (0.152)
Low beta	573	0.331*** (0.033)	0.108*** (0.008)	447	0.326*** (0.039)	-0.021 (0.019)
Deletions						
High beta	246	-0.455*** (0.036)	-0.165*** (0.016)	234	-0.402*** (0.039)	0.109*** (0.034)
Low beta	574	0.189*** (0.029)	0.063*** (0.010)	459	0.123*** (0.039)	0.016 (0.014)
$Panel\ C: monthly\ re$						
Additions						
High beta	379	-0.894*** (0.221)	-0.018* (0.014)	238	-1.477*** (0.451)	0.799* (0.551)
Low beta	443	0.670*** (0.099)	0.132*** (0.013)	463	1.168*** (0.185)	-0.554*** (0.101)
Deletions						
High beta	428	-0.337*** (0.063)	-0.085*** (0.012)	270	-0.707*** (0.302)	0.300* (0.206)
Low beta	397	0.179*** (0.022)	0.035*** (0.012)	426	0.390*** (0.039)	-0.165*** (0.028)

As shown in Table 2, for daily univariate regression, additions of high-beta stocks lead to a beta decrease of -0.212 and an R^2 increase of 0.077, both significant. For low-beta stocks, beta increases by 0.212 and R^2 increases by 0.144, both significant. The opposing changes between high-beta and low-beta stocks offset each other, explaining the insignificant overall change in beta observed in Table 1. For deletions, high-beta stocks show a decrease in beta of -0.134 and in R^2 of -0.071, while low-beta stocks show an increase in beta of 0.085 and an increase in R^2 of 0.017.

In daily bivariate regression, similar patterns are observed. When additions involve high-beta stocks, CSI300 beta decreases by -0.229, while for low-beta stocks, it increases by 0.323. For deletions, high-beta stocks lead to a decrease in CSI300 beta of -0.205, and low-beta stocks increase CSI300 beta by 0.062. These results confirm that the offsetting effects of high-beta and low-beta stocks explain the overall insignificant change in Table 1.

At weekly frequency, univariate regression shows that for additions, high-beta stocks have a beta decrease of -0.814 and R^2 decrease of -0.043, both significant, while low-beta stocks have a beta increase of 0.331 and R^2 increase of 0.108. For deletions, high-beta stocks exhibit a beta decrease of -0.455 and R^2 decrease of -0.165, while low-beta stocks show beta increase of 0.189 and R^2 increase of 0.063, all significant. Bivariate regression confirms similar patterns, with CSI300 beta decreasing for high-beta stocks and increasing for low-beta stocks for both additions and deletions.

At monthly frequency, univariate regression shows that additions of high-beta stocks result in a beta decrease of -0.894 and R^2 decrease of -0.018, while low-beta stocks exhibit a beta increase of 0.670 and R^2 increase of 0.132. For deletions, high-beta stocks show a beta decrease of -0.337 and R^2 decrease of -0.085, while low-beta stocks show a beta increase of 0.179 and R^2 increase of 0.035. In bivariate regression, high-beta stocks show a CSI300 beta decrease of -1.477 for additions and -0.707 for deletions, while low-beta stocks show increases of 1.168 and 0.390, respectively. These patterns confirm that the offsetting effects of high-beta and low-beta stocks are responsible for the insignificant overall changes in Table 1.

4. Robustness Test

As suggested, the betas of stocks and portfolios tend to revert toward the mean value of one. However, previous studies on changes in comovement generally assume that beta is stationary and do not account for this mean-reversion effect. In this section, we relax the stationarity assumption and adjust the observed changes in beta to reflect the variations without mean reversion.

As stated, following adjusted beta in practice is used to forecast the value of beta in the next period based on beta mean reversion:

$$\beta_{i,t+1}^{adjusted} = \frac{1}{3} + \frac{2}{3}\beta_{i,t}$$

where $\beta_{i,t}$ denotes the beta of stock *i* at time *t*, $\beta_{i,t+1}^{adjusted}$ denotes the adjusted beta of stock *i* at time *t*.

We further define the change in comovement without effect of mean reversion of beta as

$$\Delta\beta^{adjusted} = \beta_{post} - \beta_{pre}^{adjusted}$$

where $\beta_{pre}^{adjusted}$ denotes adjusted beta before the event, β_{post} denotes beta after the event, $\Delta\beta^{adjusted}$ denotes adjusted change of beta.

As shown in Table 3, the adjusted changes in beta and R² for high-beta and low-beta stocks are reported for univariate and bivariate regressions after additions and deletions at daily, weekly, and monthly frequencies.

Table 3. Changes in Adjusted Beta and R² for High-Beta and Low-Beta Stocks in CSI 300 Index Additions and Deletions at Daily, Weekly, and Monthly Frequencies.

sample	univariate			bivariate		
	N	$\overline{\Delta\beta^{adjusted}}$(s.e.)	$\overline{\Delta R^2}$(s.e.)	N	$\overline{\Delta\beta_{CSI300}^{adjusted}}$(s.e.)	$\overline{\Delta\beta_{nonCSI300}^{adjusted}}$(s.e.)
Panel A: daily returns						
Additions						
High beta	442	-0.097*** (0.017)	0.077*** (0.010)	244	-0.109*** (0.023)	-0.336*** (0.020)
Low beta	381	0.108*** (0.019)	0.144*** (0.010)	459	0.133*** (0.021)	-0.374*** (0.016)
Deletions						
High beta	449	-0.069*** (0.014)	-0.071*** (0.009)	206	-0.139*** (0.024)	-0.215*** (0.014)
Low beta	372	0.010 (0.016)	0.017* (0.011)	488	-0.070*** (0.016)	-0.201*** (0.011)
Panel B: weekly returr						
Additions						
High beta	250	-0.600*** (0.083)	-0.043*** (0.016)	256	-0.546*** (0.129)	-0.228** (0.102)
Low beta	573	0.101*** (0.027)	0.108*** (0.008)	447	0.137*** (0.031)	-0.280*** (0.015)
Deletions						
High beta	246	-0.362*** (0.034)	-0.165*** (0.016)	234	-0.296*** (0.034)	-0.190*** (0.025)
Low beta	574	-0.001	0.063***	459	-0.001	-0.255***

		(0.027)	(0.010)		(0.038)	(0.013)
Panel C: monthly retur						
Additions						
High beta	379	-0.560***	-0.018*	238	-0.957***	0.243
		(0.149)	(0.014)		(0.301)	(0.367)
Low beta	443	0.422***	0.132***	463	0.731***	-0.634***
		(0.068)	(0.013)		(0.125)	(0.068)
Deletions						
High beta	428	-0.222***	-0.085***	270	-0.540**	-0.062
		(0.058)	(0.012)		(0.273)	(0.140)
Low beta	397	0.082***	0.035***	426	0.195***	-0.337***
		(0.021)	(0.012)		(0.035)	(0.022)

At daily frequency, univariate regression shows that for high-beta stocks, beta decreases by -0.097 and R^2 increases by 0.077 when a stock is added, both significant at the 1% level. For low-beta stocks, beta increases by 0.108 and R^2 rises by 0.144, also significant at 1%. Compared with Table 2, the directions of change are consistent, but the magnitude of change is smaller, indicating reduced effect sizes. For deletions, high-beta stocks exhibit a decrease in beta of -0.069 and a decrease in R^2 of -0.071, whereas low-beta stocks show a slight increase in beta of 0.010 and an increase in R^2 of 0.017, again smaller than in Table 2.

The daily bivariate regression shows a similar pattern. For high-beta stocks added to the index, CSI300 beta decreases by -0.109 and nonCSI300 beta decreases by -0.336, both significant. For low-beta stocks, CSI300 beta increases by 0.133 while nonCSI300 beta decreases by -0.374, also significant, but the magnitude is reduced compared with Table 2. For deletions, high-beta stocks show a decrease in CSI300 beta of -0.139 and nonCSI300 beta of -0.215, while low-beta stocks exhibit decreases of -0.070 in CSI300 beta and -0.201 in nonCSI300 beta, all significant at the 1% level.

At weekly frequency, univariate regression shows that high-beta stocks added to the index experience a decrease in beta of -0.600 and R^2 of -0.043, significant at 1%. Low-beta stocks show an increase in beta of 0.101 and R^2 of 0.108. These changes are consistent in direction with Table 2 but smaller in magnitude. For deletions, high-beta stocks decrease in beta by -0.362 and R^2 by -0.165, while low-beta stocks show an increase in R^2 of 0.063, all significant at 1%.

In weekly bivariate regression, high-beta stocks added to the index exhibit a decrease in CSI300 beta of -0.546 and nonCSI300 beta of -0.228, both significant. Low-beta stocks added show an increase in CSI300 beta of 0.137 and a decrease in nonCSI300 beta of -0.280, also significant. For deletions, high-beta stocks show decreases in CSI300 beta of -0.296 and nonCSI300 beta of -0.190, while low-beta stocks show a decrease in nonCSI300 beta of -0.255, all significant at 1%.

At monthly frequency, univariate regression shows high-beta stocks added to the index decrease in beta by -0.560 and in R^2 by -0.018, both significant, while low-beta stocks increase in beta by 0.422 and R^2 by 0.132, also significant. For deletions, high-beta stocks decrease in beta by -0.222 and R^2 by -0.085, while low-beta stocks increase in beta by 0.082 and R^2 by 0.035, again showing smaller magnitudes compared with Table 2.

The monthly bivariate regression confirms similar patterns. High-beta stocks added show a decrease in CSI300 beta of -0.957, while low-beta stocks exhibit an increase of 0.731, both significant at 1%. For deletions, high-beta stocks show a decrease in CSI300 beta of -0.540, and low-beta stocks show an increase of 0.195, with a corresponding decrease in nonCSI300 beta of -0.337, all significant. Across all frequencies, the adjusted changes indicate that the effect of additions and deletions on high-beta and low-beta stocks persists, but the magnitude of change is smaller after accounting for mean reversion.

5. Conclusion

In this paper, we first examine the comovement between individual stock returns and the CSI300 index surrounding additions and deletions from the index. Our analysis reveals that the overall change in comovement following stock additions is statistically insignificant. To further investigate this, we separate stocks into high-beta and low-beta groups and analyze their comovement patterns individually. The results show a clear divergence: high-beta stocks exhibit a significant decrease in comovement with the index, whereas low-beta stocks show a substantial increase. These contrasting effects offset each other, resulting in the observed insignificant overall change in comovement, as reported in Table 1. This finding is consistent with prior arguments regarding the role of beta heterogeneity in driving comovement dynamics.

To ensure the robustness of our results, we further adjust for potential nonstationarity in beta by employing an adjusted-beta approach. The robustness tests confirm that the divergent patterns in high-beta and low-beta stocks persist even when accounting for mean reversion, indicating that our findings are not sensitive to assumptions of beta stationarity. Overall, this study highlights the importance of considering beta heterogeneity when evaluating the impact of index reconstitutions on stock comovement. The results suggest that aggregate measures of comovement may mask significant underlying heterogeneity across different stock groups, emphasizing the need for nuanced analysis in market microstructure and asset pricing research.

This research provides a clearer understanding of how index changes influence market dynamics, offering both theoretical insights and practical implications for investors and portfolio managers. By identifying the opposing effects of high- and low-beta stocks, our findings contribute to the literature on market comovement, index arbitrage, and the mechanisms through which index.

References

1. N. Barberis, and A. Shleifer, "Style investing," *Journal of financial Economics*, vol. 68, no. 2, pp. 161-199, 2003. doi: 10.1016/s0304-405x(03)00064-3
2. N. Barberis, A. Shleifer, and J. Wurgler, "Comovement," *Journal of financial economics*, vol. 75, no. 2, pp. 283-317, 2005. doi: 10.1016/j.jfineco.2004.04.003
3. J. B. Baesel, "On the assessment of risk: Some further considerations," *The Journal of Finance*, vol. 29, no. 5, pp. 1491-1494, 1974. doi: 10.1111/j.1540-6261.1974.tb03130.x
4. M. E. Blume, "Betas and their regression tendencies," *The Journal of Finance*, vol. 30, no. 3, pp. 785-795, 1975. doi: 10.1111/j.1540-6261.1975.tb01850.x
5. B. S. Lee, and G. Hong, "On the dual characteristics of closed-end country funds," *Journal of International Money and Finance*, vol. 21, no. 5, pp. 589-618, 2002.
6. B. H. Boyer, "Stylerelated comovement: Fundamentals or labels?," *The Journal of Finance*, vol. 66, no. 1, pp. 307-332, 2011.
7. H. Chen, V. Singal, and R. F. Whitelaw, "Comovement revisited," *Journal of Financial Economics*, vol. 121, no. 3, pp. 624-644, 2016. doi: 10.1016/j.jfineco.2016.05.007
8. S. Claessens, and Y. Yafeh, "Comovement of newly added stocks with national market indices: Evidence from around the world," *Review of Finance*, vol. 17, no. 1, pp. 203-227, 2013. doi: 10.1093/rof/rfs001
9. T. C. Green, and B. H. Hwang, "Price-based return comovement," *Journal of financial economics*, vol. 93, no. 1, pp. 37-50, 2009.
10. R. Greenwood, "Excess comovement of stock returns: Evidence from cross-sectional variation in Nikkei 225 weights," *The review of financial studies*, vol. 21, no. 3, pp. 1153-1186, 2008. doi: 10.1093/rfs/hhm052
11. R. C. Klemkosky, and J. D. Martin, "The adjustment of beta forecasts," *The journal of Finance*, vol. 30, no. 4, pp. 1123-1128, 1975. doi: 10.1111/j.1540-6261.1975.tb01027.x
12. A. Kumar, and C. M. Lee, "Retail investor sentiment and return comovements," *The Journal of Finance*, vol. 61, no. 5, pp. 2451-2486, 2006. doi: 10.2139/ssrn.502843
13. C. M. Lee, A. Shleifer, and R. H. Thaler, "Investor sentiment and the closedend fund puzzle," *The journal of finance*, vol. 46, no. 1, pp. 75-109, 1991.
14. Y. Liao, J. Coakley, and N. Kellard, "Index tracking and beta arbitrage effects in comovement," *International review of financial analysis*, vol. 83, p. 102330, 2022. doi: 10.1016/j.irfa.2022.102330
15. B. Mase, "Comovement in the FTSE 100 index," *Applied Financial Economics Letters*, vol. 4, no. 1, pp. 9-12, 2008. doi: 10.1080/17446540701222425

16. F. Meyer-Bullerdiek, "The Quality of Blume and Vasicek Betas for forecasting systematic risk: Evidence from a German stock portfolio," *Journal of Applied Finance & Banking*, vol. 14, no. 6, pp. 1-15, 2024. doi: 10.47260/jafb/1461
17. R. S. Pindyck, and J. J. Rotemberg, "The comovement of stock prices," *The quarterly journal of economics*, vol. 108, no. 4, pp. 1073-1104, 1993. doi: 10.2307/2118460
18. C. Pirinsky, and Q. Wang, "Does corporate headquarters location matter for stock returns?," *The journal of finance*, vol. 61, no. 4, pp. 1991-2015, 2006.
19. O. Even-Tov, and N. B. Ozel, "What moves stock prices around credit rating changes?," *Review of Accounting Studies*, vol. 26, no. 4, pp. 1390-1427, 2021. doi: 10.1007/s11142-020-09573-6
20. A. M. Vijh, "S&P 500 trading strategies and stock betas," *The Review of Financial Studies*, vol. 7, no. 1, pp. 215-251, 1994.