The Ungeheuer and Weber (2021) Comove and Stock Returns Effect Disappears with Control for Idiosyncratic Volatility*

Peixin Li† and Baolian Wang‡

July 4, 2022

Abstract

Ungeheuer and Weber (2021, UW) propose a *Comove* measure, the fraction of weekly stock returns that are in the same direction as the market, and document that *Comove* positively predicts cross-sectional stock returns. We show that *Comove* is strongly negatively correlated with idiosyncratic volatility. Controlling for the idiosyncratic volatility effect renders the *Comove* effect insignificant, but not vice versa. For example, after controlling for the idiosyncratic volatility effect, the long-short *Comove* portfolio's monthly alpha falls to 0.115% (t = 1.55) in the US and 0.014% (t = 0.29) in 23 international markets.

JEL Code: G11, G12, G15, G41

Keywords: Frequency of comovement; idiosyncratic volatility; counting heuristic; international finance

---

*This paper is partially based on Li's coursework in a Ph.D. seminar course in spring 2021. We are grateful to Ivo Welch (the editor) and an anonymous referee for very helpful comments. We thank Nicholas Barberis, Cary Frydman, Frank Weikai Li, Andy Naranjo, Jay Ritter, and Dexin Zhou for their valuable comments. We also thank Michael Ungeheuer and Martin Weber for their comments on this critique and Michael Ungeheuer for answering our questions on the details of their data processing. All errors are our own.
†Li is from the Warrington College of Business Administration, University of Florida, Gainesville FL, 32611. Email: pli2@ufl.edu.
‡Wang is from the Warrington College of Business Administration, University of Florida, Gainesville FL, 32611. Email: baolian.wang@warrington.ufl.edu.

1. Introduction

How investors evaluate the risk of an asset is central to asset pricing. A stock's market beta, measured as the covariance between its stock return and the market return, divided by the variance of the market return, is the most widely used systematic risk measure. Recently, Ungeheuer and Weber (2021, UW) argue that the seminal portfolio selection and asset pricing models (Markowitz, 1952; Sharpe, 1964) do not justify the necessity of measuring the stock-market return dependence based on beta. Instead, they propose a frequency-based return dependence measure: *Comove*. *Comove* is the fraction of weekly return observations with equal signs of stock and market returns, that is, the fraction of observations with ($r_{i,t} > 0, r_{m,t} > 0$) or ($r_{i,t} < 0, r_{m,t} < 0$), where $r_{i,t}$ and $r_{m,t}$ denote the week *t* returns of stock *i* and the market, respectively.[1]

The stock market beta, as a covariance-based measure, considers the magnitude of returns. In contrast, *Comove* only considers the sign of returns. Hence, relative to beta, *Comove* underweights the dependence in the tails. UW's proposal of *Comove* is based on four experiments in which they show that participants can understand dependence in moderate returns, but most participants cannot correctly answer questions about dependence in extreme returns. They write, "Consequently, participants' beliefs about overall dependence tend to increase with the frequency of comovement between stock returns, as if participants were using a counting heuristic." In other words, relative to beta, *Comove* is a better measure of perceived return dependence.

They then adopt *Comove* as a measure of the perceived systematic risk to test the capital asset pricing model (CAPM) using US data from 1963 to 2015. Given the natural positive correlation between beta and *Comove*, UW sort stocks into quintiles by beta first and *Comove* second to get exposure to *Comove* while holding beta relatively constant across portfolios. They find evidence that stocks with a higher *Comove*

[1] A number of studies have examined biases in how dependence is perceived (Jennings, Amabile, and Ross, 1982; Matthies, 2020) and how misunderstanding correlations can bias decision-making (Levy and Razin, 2015; Enke and Zimmermann, 2017).

value provide a monthly return premium of about 0.30% (t > 3). They claim that "This result is consistent with investors requiring a reward for holding stocks with higher perceived dependence, in line with the CAPM."

UW's proposal of *Comove* is plausible and thought-provoking. Their empirical finding on the pricing of *Comove* is striking, especially given the well-known fact that beta does not predict return in the way predicted by the CAPM (Fama and French, 1992; Frazzini and Pedersen, 2014) and the recent survey evidence that participants do not view an assets' correlation with consumption growth or the market as relevant to investment decisions (Chinco, Hartzmark, and Sussman, 2021).

UW argues that *Comove* is a better measure of perceived return dependence relative to beta because it underweights the dependence in tails. In contrast, we argue that *Comove* is also related to idiosyncratic volatility (*IVOL*), which is known to be a strong return predictor (Ang, Hodrick, Xing, and Zhang, 2006, 2009).[2] Consider two firms with the same beta (assuming beta is positive and is the same for moderate and extreme returns) but different idiosyncratic volatility. Given the same beta, a stock is more likely to have the same signed return as the market if it has lower idiosyncratic volatility. Going to the extreme when idiosyncratic volatility is zero, any stock with a positive beta has a *Comove* value of one. Empirically, the *Comove* portfolio sort exhibits significant variations in idiosyncratic volatility both contemporaneous with *Comove* and after portfolio formation. Consistent with the prediction of UW, the *Comove* sort shows contemporaneous variations in the asymmetry of moderate and extreme return betas. However, the variations in asymmetric betas largely disappear following the portfolio formation.

In this paper, using US data and data from 23 international stock markets, we document that the *Comove*-return relationship is not robust to properly controlling for the idiosyncratic volatility effect.

[2] One possible interpretation of the *IVOL* effect is that *IVOL* proxies for other return predictors, such as skewness. Investors may dislike *IVOL* but like positive skewness, and the return effect of the latter dominates (Boyer, Mitton, and Vorkink, 2010; Bali, Cakici, and Whitelaw, 2011; Barberis, Jin, and Wang, 2021). Another interpretation is the arbitrage asymmetry mechanism put forth by Stambaugh, Yu, and Yuan (2015).

Controlling for *IVOL* is a natural sensitivity test because of the above-discussed mechanical relationship between *Comove* and *IVOL*. In fact, UW's experiments also control volatility. We document that UW's *Comove*-return relationship does not survive the adjustment for an idiosyncratic volatility factor or in a triple-sort analysis.[3] It also does not survive in Fama-MacBeth regressions once the nonlinearity between beta, idiosyncratic volatility, and *Comove* is considered. We find that an idiosyncratic volatility factor, constructed in the same way as the long-short *Comove* portfolio, fully explains the *Comove* return premium. In the US, the long-short *Comove* portfolio's monthly alpha becomes a statistically and economically insignificant 0.12% (t = 1.55), and in the international data, it becomes 0.01% (t = 0.29). In a triple sort analysis, we sort stocks dependently by beta, idiosyncratic volatility, and then *Comove*. We then pool stocks across beta-idiosyncratic volatility portfolios and within *Comove* quintiles to obtain a portfolio sort by *Comove* controlling for beta and idiosyncratic volatility. Significant variations in *Comove* remain in this triple sort. However, the *Comove* return premium becomes much smaller and statistically insignificant. Our tests show that the part of *Comove* variation that is independent of idiosyncratic volatility is not priced. In contrast, the idiosyncratic volatility-return relationship survives after controlling for *Comove* in similar tests.

UW's experimental analysis shows that investors diversify more when *Comove* is higher, even after keeping both volatility and correlation constant across treatments (experiment 2). How can we reconcile their experimental evidence with our empirical results? Levitt and List (2007) argue that human behaviors may be sensitive to various factors that are systematically different between the lab and the real world. First, in UW, the extreme returns of the two experiment assets always happen at the same time, and so as the moderate returns. This co-occurrence design is different from the real-world stock markets. Hence, the

[3] We use the word "factor" interchangeably with "long-short anomaly portfolio." Even though we call the long-short *IVOL* portfolio a factor, we do not hold the view that it is necessarily a risk factor.

non-natural design may contribute to the discrepancy between the lab and the field. Second, compared with the experimental subjects, real-world investors may be more inexperienced and sophisticated.

Overall, our results show that UW's empirical finding of a positive *Comove*-return relationship is driven by inadequately controlling the idiosyncratic volatility effect. In horse race tests, the idiosyncratic volatility effect survives after controlling for the *Comove* effect. The findings reject UW's conclusion that *Comove* predicts returns because it is a better measure of perceived return dependence. The positive correlation between *Comove* and stock return is not evidence for the CAPM. However, the results do not necessarily reject the general idea about perceived dependence, as investors may form their beliefs on return dependence in other ways. But alternative perceived dependence measures are yet to be developed.

2. Data

2.1 Stock and index returns

Following UW, we measure the frequency of comovement (*Comove*) as the fraction of return observations with equal signs of weekly stock and market returns from the last year (52 weeks), that is, the fraction of weekly observations with ($r_{i,t} > 0, r_{m,t} > 0$) or ($r_{i,t} < 0, r_{m,t} < 0$). In the US, we use the S&P 500 as the market index. UW select the S&P 500 because of its high visibility. In other markets, we also use the most visible local market index. For example, we use the Nikkei 225 Index for Japan and the FTSE 100 Index for the UK. Data on the S&P 500 index are from the Center for Research in Security Prices (CRSP), and data on other indexes, except for the TSX index of Canada, are from Compustat. Compustat does not cover TSX, for which we obtain data from the Wall Street Journal. Because Compustat does not have data on index dividends, except for the S&P 500 index, we measure $r_{m,t}$ without dividends. For the US, measuring *Comove* using $r_{m,t}$ with dividends or not has almost no impact on the results. Data on the S&P 500 index returns, both with and without dividends, are available from CRSP, allowing us to do this sensitivity test. We require at least 26 weeks' data in estimating *Comove*.

We obtain daily and monthly stock return data from CRSP for the US and from Compustat for all other markets. We follow UW in processing US data and Jensen, Kelly, and Pedersen (2021) in processing international data.

For the US, our sample starts with all firms traded on the NYSE, Amex, and NASDAQ from July 1963 to December 2020. UW start their sample in January 1963 and end it in December 2015. The change in the sample period has minimal impact on the results. We exclude securities other than common shares. We adjust the stock returns for delisting. If a delisting return is missing and the delisting is performance-related, we set the delisting return to –30% (Shumway, 1997). For the international markets, we focus on stocks that are identified by Compustat as the primary security of the underlying firm and assign stocks to countries based on the location of their exchange. Delisting returns are unavailable in the international data, so we assign a –30% return to all performance-based delistings. We study US dollar-denominated returns and compute excess returns using the US one-month T-bill rate. Exchange rate data are from Compustat. To alleviate the influence of data errors in the international data, we winsorize returns from Compustat at the 0.1% and 99.9% levels of returns from CRSP in a given month.

Following UW, for the US sample, we exclude stocks whose price falls below \$1 or whose market capitalization falls below the 10th NYSE percentile in the month before portfolio formation.[4] We follow a similar procedure in dealing with low-priced stocks and small firms in the international data. For each international market, we exclude stocks whose price falls below the 10th percentile of its market-specific distribution or whose market capitalization falls below the 10th percentile of its market-specific distribution in the month before portfolio formation. We only keep the market-months with at least 200

[4] When excluding the microcap stocks, UW compare a stock's market capitalization at the end of month $t - 1$ with the NYSE breakpoint at the end of month t. They also exclude the firms with a market capitalization larger than the 100th NYSE percentile. Hence, in recent years, firms like Alphabet, Apple, Facebook, and Microsoft are excluded. We confirmed these with the authors in private conversations. As a result of this treatment, they exclude more firms in the months with higher market returns and fewer firms in the months with lower market returns. Such treatment, although unconventional, has little effect on the cross-sectional return analysis.

stocks satisfying the above data requirements. For a market to be included in our sample, there needs to be at least 120 such months. Including the US, 24 stock markets enter our sample.

Table 1 lists the sampled stock markets. All the G7 countries are in our sample. Besides them, there are five additional developed markets and twelve non-developed markets. Within each group, the markets are ranked by the average total market capitalization over the sample period. For the consideration of factor models, following Fama and French (2012), we group the markets into four regions: Asia Pacific ex Japan, Europe, Japan, and North America. We group Israel and South Africa as part of Europe for the lack of a better grouping. *Start* is the first month with a valid observation. *Stocks* is the average number of stocks available. *Number of months* is the total number of months for each market. *Index* is the stock market index we use to measure *Comove* for each stock market. Among the non-US stock markets, Canada, Japan, and the UK have the longest sample, starting in the middle 1980s.

2.2 Asset pricing factors

For the US, we use the Fama and French (2015) five-factor model. For other developed markets, we use a six-factor model: the regional five-factor model augmented with a local market factor. The regional five factors are constructed using data within each region. Data on the factors are from Kenneth French's website.[5] The local market returns are value-weighted across all the stocks, constructed following Jensen, Kelly, and Pedersen (2021). As Japan is a separate region, there is no difference between its regional market factor and its local market factor. Empirically, for Japan, the market factor provided by Kenneth French and the market factor constructed following Jensen, Kelly, and Pedersen (2021) are almost perfectly correlated with a correlation coefficient of 0.997. Hence, we do not do the augmentation for Japan and use the market factor from Kenneth French's website. For non-developed markets, in addition to their local and regional factors, we augment with the emerging markets five factors as provided by

[5] In the original paper, Fama and French (2012) do not study the profitability and investment factors. The data available on French's website have these two factors, and they are constructed in a similar way as other factors.

Kenneth French. For simplicity, in the paper, we call the alphas from the above factor adjustment "regional-factor alphas."

3. Results

In Section 3.1, we replicate the asset pricing results of UW in the US and 23 other stock markets. In Section 3.2, we examine how *Comove* is correlated with the asymmetry between the dependence in frequent moderate returns and dependence in extreme returns and how *Comove* is correlated with idiosyncratic volatility. We examine the *Comove*-return relationship after controlling for idiosyncratic volatility using a factor adjustment approach, a triple sort approach, and Fama-MacBeth regressions in Sections 3.3, 3.4, and 3.5, respectively. In Section 3.6, we examine how the idiosyncratic volatility-return relationship is affected after controlling for *Comove*.

3.1 The Comove portfolios

Following UW, we conduct double portfolio sorts. To implement the double sort analysis, we use the following procedure. At the beginning of each month, we sort stocks into quintiles based on beta. Within each beta quintile, we again sort stocks into quintiles based on *Comove*. The returns and other characteristics of each of the five *Comove* quintiles portfolios are then calculated across different beta quintiles. Like UW, we estimate beta using the last year's daily stock and value-weighted local market returns.

Table IA1 in the Internet Appendix reports the average *Comove* across the *Comove* quintiles. Besides, we also report the difference between the high and low *Comove* quintiles and its *t* value. The double sort leads to significant variations in *Comove* across portfolios. For the US sample, the statistics are almost identical to those reported by UW in their Internet Appendix. In Table IA2, we replicate part of the summary statistics UW reported in their Internet Appendix, and our replication matches that of UW very closely, except for the average excess returns.[6]

Table 2 reports the performance of the *Comove* portfolios. Following UW, all portfolios are equal-weighted.[7] In the US, the difference in the raw returns between the high *Comove* and the low *Comove* portfolio is 0.31% (t = 3.43) per month, and the five-factor alpha is 0.26% (t = 3.90), similar to those reported by UW. t-statistics are calculated based on Newey and West (1987) standard errors with 12 lags. We choose 12 lags because *Comove* is calculated using a rolling 12-month window. A significant return spread between the high and low *Comove* portfolio exists in all other G7 countries except Canada. It also exists in several other major stock markets, including Sweden, India, South Korea, and Taiwan. In most of these markets with a significant raw return spread, the spread survives the factor adjustment. UW (2021) propose *Comove* because investors use a counting heuristic to form their dependence perception. Based on their argument, we may expect the *Comove* effect to be stronger in the less developed economies. However, Table 2 reports the opposite.

In the last row of Table 2, we aggregate the high-minus-low *Comove* portfolios across the 23 international markets. Following Jensen, Kelly, and Pedersen (2021), we use the total market capitalization to weight the excess return or abnormal returns of the market-specific high-minus-low *Comove* portfolio. Specifically, each market's high-minus-low *Comove* portfolio of a month is weighted by the market's lagged total capitalization. In the regional-factor model, monthly abnormal returns are defined as the sum of the alpha and monthly residuals from the regional-factor regressions. As shown in

[6] UW report a pooled mean excess return of 0.54%, while ours is 0.73%. The discrepancy is mainly driven by our difference in excluding microcap stocks. See footnote 4 for the difference. Out of the 19 basis points difference in mean excess returns, the difference in excluding microcap stocks explains about 15 basis points. The remaining difference can be attributed to the sample period difference. Our sample includes the last five years that have relatively high returns.

[7] The *Comove* effect is weaker in the value-weighted portfolio analysis. In the US, the high-minus-low *Comove* portfolio (double sort by beta first and *Comove* second) has a raw return of 0.07% (t = 0.70) and a five-factor alpha of 0.14% (t = 1.52). Across the 23 international markets, the high-minus-low *Comove* portfolio has a raw return of 0.24% (t = 2.74) and a regional factor alpha of 0.20% (t = 3.01). Similar to the equal-weighted results, in the international data, the *Comove*-return relationship disappears after controlling for the idiosyncratic volatility effect. We report the value-weighted results in Tables IA 3-6 of the Internet Appendix.

Table 2, across the 23 international markets, for the high-minus-low *Comove* portfolio, its average monthly excess return is 0.22 (t = 3.02), and its regional-factor alpha is 0.15 (t = 2.84).

3.2 The characteristics of the Comove portfolios

As expected, *Comove* is positively correlated with *beta* with an average cross-sectional correlation coefficient of 0.35. *Comove* is negatively correlated with *IVOL* with an average cross-sectional correlation coefficient of -0.10. The relatively low *Comove-IVOL* correlation is partially driven by the fact that *IVOL* and *beta* are strongly positively correlated with a correlation coefficient of 0.33. If we calculate the cross-sectional correlation within each *beta* quintile (just like how the *Comove* portfolios are formed in UW), we get an average correlation coefficient of -0.27.

As discussed in the Introduction, the *Comove* sort may capture variations of the asymmetry between the dependence in frequent moderate returns and dependence in extreme returns. It may also capture variations in idiosyncratic volatility. We measure the dependence in moderate returns and the dependence in extreme returns using moderate beta ($\beta^{moderate}$) and extreme beta ($\beta^{extreme}$), respectively. To calculate moderate and extreme betas, for each twelve months estimation period, we group the days into two categories by the absolute value of the market return. The extreme market return days are the days with the 20% highest absolute market returns, and the remaining days are the moderate return days.[8] Moderate beta is the beta estimated using the data of the moderate return days, and extreme beta is estimated using data of the extreme return days.[9] For moderate beta and extreme beta estimation, we require at least ten valid daily observations. In the US, idiosyncratic volatility is calculated relative to the

---

[8] We get qualitatively similar results if we define the extreme market return days as the days with the 10% highest absolute market returns and the remaining days as the moderate market return days. The results are reported in Table IA8 of the Internet Appendix.

[9] We calculate moderate and extreme betas to examine the asymmetry between dependence in frequent moderate returns and dependence in extreme returns. In UW, the extreme returns of the two experiment assets always happen at the same time, and so as the moderate returns. Such patterns are different in the real financial markets. We believe our way of calculating the two betas is a reasonable and necessary adjustment. In the US, among the moderate return days, the average absolute market return is 0.43%, and the average individual stock return is 1.61%. Among the extreme return days, the average absolute market return is 1.64%, and the average individual stock return is 2.32%. Both the absolute market return and the absolute stock returns are significantly higher on the extreme return days.

Fama and French (1993) three-factor model following Ang, Hodrick, Xing, and Zhang (2006). In the international data, it is calculated relative to the local market factor. Reported idiosyncratic volatility is annualized by multiplying the daily return standard deviation by the square root of 252. We winsorize moderate beta, extreme beta, and *IVOL* at the 1% and 99% levels by markets for all the markets, including the US.

In Table 3, we report both the contemporaneous characteristics calculated with the same data used to calculate *Comove* (i.e., twelve months before portfolio formation) and the future characteristics calculated using data in the twelve months after the portfolio formation. For each of the characteristics, we report the difference between the high and low *Comove* portfolios and its *t* value. For the aggregate international estimates, similar to the way we aggregate portfolio returns, we weight each market's monthly differences using that market's lagged total market capitalization.

The characteristics show a remarkably similar pattern across markets. For presentation purposes, we only report the US result and the aggregate international results. See Table IA7 for the results for individual economies. The *Comove* sort leads to a significant difference in the contemporaneous moderate beta. For example, the average moderate beta is 0.10 higher in the high *Comove* portfolio than in the low *Comove* portfolio in the US. This difference is similar to the beta difference reported by UW. Across the 23 international markets, the total market capitalization-weighted average difference in the contemporaneous moderate beta between the high and low *Comove* portfolios is 0.08 (t = 26.27), similar to the US result. The high *Comove* quintile also has a higher contemporaneous extreme beta in most markets, but its magnitude is significantly smaller. As argued by UW, relative to beta, *Comove* underweights the dependence in tails. Hence, the relatively larger difference in the moderate beta is expected. Also expected, the high *Comove* quintile has lower contemporaneous *IVOL* in all the markets. The difference in *IVOL* is economically and statistically stronger than the difference in betas. For example, in the US, the difference in the moderate beta represents about 10% of the unconditional mean (i.e., 0.97).

In comparison, the difference in *IVOL* is more than 40% of the unconditional mean (i.e., 0.31). The *t* value of the *IVOL* difference is typically larger than that of the moderate beta difference.

The difference in *IVOL* persists and has a similar magnitude in the period after portfolio formation. In the post-formation period, the differences in moderate beta and extreme beta increase significantly, especially for the extreme beta. In fact, the moderate and extreme beta asymmetry largely disappears in the post-formation period for both the US and the international markets. The increase in the differences of both betas between the high and low *Comove* portfolios in the post-formation period suggests that *Comove* contains information on the traditional beta beyond historical beta, perhaps because of the measurement error of the historical beta. The disappearance of the moderate and extreme beta asymmetry suggests that *Comove* does not predict return dependence asymmetry out of the sample.

3.3 Adjustment with an IVOL factor

We construct the *IVOL* factor in the same way as the construction of the *Comove* portfolios. Specifically, we double-sort first by beta and then by *IVOL*. The *IVOL* factor return is the average return of the five low *IVOL* minus high *IVOL* portfolios across the beta quintiles. We calculate the *IVOL* factor as low minus high instead of high minus low per the evidence of Ang, Hodrick, Xing, and Zhang (2006, 2009) that low *IVOL* stocks have higher average returns than high *IVOL* stocks. The same as the *Comove* portfolio construction, the *IVOL* portfolios are equal-weighted.

We examine whether the *IVOL* factor explains the high-minus-low *Comove* portfolio returns in spanning regressions. Table 4 provides strong evidence that the *Comove* effect is driven by its exposure to *IVOL*. We augment the asset pricing model used in Table 2 with the *IVOL* factor. As expected, the *Comove* portfolio has a strong loading on the *IVOL* factor in all the markets. Consistent with the finding in Table 3 that *Comove* correlates with the future beta, the high-minus-low *Comove* portfolio has positive and significant loading on the market factor. After the adjustment, the alphas of the high-minus-low *Comove* portfolio become insignificant in both the US and the international markets. In fact, the alphas are either insignificant or significantly negative except for France, Germany, and Taiwan.[10] In Table IA9, we use a two-factor model: the local market factor and the local *IVOL* factor. In this specification, the alphas are even lower. They are 0.04% (t = 0.63) and -0.03% (t = -0.57) for the US and the international aggregation, respectively. These findings show that *Comove* adds little explanatory power to the cross-sectional stock returns (Fama, 1998; Barillas and Shanken, 2017).

3.4 Triple sort

Table 5 reports the triple sort results. At the beginning of each month, we sort stocks into terciles based on beta. Within each beta tercile, we again sort stocks into deciles based on *IVOL*. Within each beta-*IVOL* portfolio, we sort stocks into *Comove* quintiles. We sort *IVOL* finer because of its strong relationship with *Comove*, as we observed in Table 3. The returns of each of the five *Comove* quintiles portfolios are then calculated across different beta-*IVOL* portfolios. The average *Comove* difference between the high and low *Comove* portfolios is about 0.20 for both the US and the international markets, suggesting that significant variations in *Comove* remain in this triple sort.

In the triple sort, the high-minus-low *Comove* portfolio spread becomes much smaller. In the US, the raw return spread is 0.17%, which is about half of that from the beta-*Comove* double sort analysis. The five-factor alpha becomes 0.11% (t = 1.66), which is about 60% smaller than that from the beta-*Comove* double sort analysis, and it becomes statistically insignificant. For the five G7 markets (Japan, UK, France, Germany, and Italy) with a positive significant *Comove* return spread, the spread survives only in Italy. Across the 23 international markets, the weighted average long-short *Comove* portfolio generates a monthly excess return of 0.06% (t = 0.84) and an alpha of 0.02% (t = 0.29), both of which are statistically indistinguishable from zero.

[10] In this table, the aggregated international alphas are calculated similarly to that in Table 2. Specifically, we weigh the sum of a market's alpha and monthly residuals using that market's lagged market capitalization. For loadings on the market factor and the *IVOL* factor and their t statistics, because they do not vary across time, we weight them using the average total market capitalization over the sample period.

3.5 Fama-MacBeth regressions

Besides the portfolio approaches, Fama-MacBeth regression is another widely used methodology. UW report their Fama-MacBeth regressions in Table IA.X of their Internet Appendix. They find that, although controlling for idiosyncratic volatility reduces the magnitude (by about 40%) and the statistical significance of the coefficient of *Comove*, the coefficient remains significantly positive.

The Fama-MacBeth regression approach has one limitation: It assumes that the relationship between stock returns and the various predictors is linear. In contrast, beta and *IVOL* are related to *Comove* in a highly nonlinear way. Hence, in our analysis, we explicitly consider the nonlinearity between beta, *IVOL*, and *Comove*. Specifically, we calculate a pseudo *Comove* measure assuming that beta is constant across extreme and moderate returns. We then examine whether this pseudo *Comove* measure explains the *Comove* effect. We construct the pseudo *Comove* measure as follows.

$$r_{i,t} - r_t^f = \alpha_i + \beta_i\left(r_{m,t} - r_t^f\right) + \varepsilon_{i,t}. \tag{1}$$

We assume that the excess return of stock *i* follows the above one-factor structure. $r_{i,t}$ is the raw return of stock *i* in week *t*. r_t^f and $r_{m,t}$ are the risk-free rate and the market return, respectively. β_i does not vary across moderate and extreme returns. The idiosyncratic volatility, $\varepsilon_{i,t}$, follows a normal distribution with a mean of zero and a standard deviation of σ_i.

The pseudo *Comove* measure is the *Comove* measure of a stock whose returns follow the process specified in Equation (1). We calculate the value of the pseudo *Comove* measure using a numerical method.[11] Specifically, for each week of the past 52 weeks, given the value of $\hat{\alpha}_i$, $\widehat{\beta_\iota}$, r_t^f and $r_{m,t}$, we generate 1,000 normally distributed random variables with the mean of zero and standard deviation of $\hat{\sigma}_i$. Like *Comove*, $\hat{\alpha}_i$, $\hat{\beta}_i$ and $\hat{\sigma}_i$ are estimated using the past 52 weeks' data. The simulated weekly return,

[11] Except for some special cases, the value of the pseudo *Comove* measure does not have an explicit mathematical expression (Cramér, 1946).

$r_{i,t}^{simu}$, is then equal to $\hat{\alpha}_i + \hat{\beta}_i(r_{m,t} - r_t^f)$ + a realization of the generated random variable. The value of the pseudo *Comove* measure is equal to the sum of $Prob(r_{i,t}^{simu} > 0, r_{m,t} > 0)$ and $Prob(r_{i,t}^{simu} < 0, r_{m,t} < 0)$ in the simulated data. The numerical method is time-consuming. Hence, for this analysis, we focus on the US sample.

We label this pseudo *Comove* measure as *Comove* (α, β, σ) to make the point that the pseudo *Comove* measure, in the cross-section, does not contain information beyond α, β, and σ. Hence, controlling for *Comove* (α, β, σ) is nothing more than controlling for α, β, and σ, although nonlinearly. Stocks with a high return in the prior 52 weeks tend to have a high α, and thus α is highly correlated with lagged returns, i.e., momentum, which is included in the regression analysis.

As an illustration of the importance of the relaxation of the linearity assumption, in untabulated results, we show that *Comove* (α, β, σ) is much more strongly linearly correlated with *Comove* than momentum, beta, and idiosyncratic volatility combined. When we regress *Comove* on momentum (defined as the cumulative stock return from month t – 12 to t – 2), beta, and idiosyncratic volatility in a Fama-MacBeth framework, we get an average R^2 of 21.6%. Momentum does not contribute to the average R^2 much. Without the momentum variable, the average R^2 is 21.0%. When we regress *Comove* on *Comove* (α, β, σ) alone, we get an average R^2 of 48.6%, which is more than doubled.

In Table 6, we examine whether *Comove* (α, β, σ) can explain the *Comove* effect. We report the average slope coefficient of the 690 monthly cross-sectional regressions and that the t-statistics are calculated based on the time-series standard deviation of these 690 parameter estimates. We observe several findings. First, in column (1), we report the baseline result with the standard choice of control variables. In this specification, the coefficient of *Comove* is 1.42 (t = 4.64). In column (2), we add *IVOL* as a control. The results in these two columns are comparable to those reported by UW in their Internet

Appendix. Similar to the results UW report, controlling for *IVOL* reduces the coefficient of *Comove* by about 40%. However, the coefficient of *Comove* remains highly statistically significant.

Second, in columns (3) and (4), we replace *Comove* with *Comove* (α, β, σ) and find that the coefficient of *Comove* (α, β, σ) is highly statistically significant, even though each individual input (beta, $Ret_{t-12, t-2,}$ and *IVOL*) used to construct *Comove* (α, β, σ) is included in the regression. The results in columns (3) and (4) highlight the importance of the linearity assumption. The tests in columns (3) and (4) work as a placebo test for the perceived dependence mechanism. If a sugar pill (pseudo *Comove*) works just as well as the drug (*Comove*) or even better, the drug is probably not effective.

Third, in column (5), based on the specification in column (1), we add *Comove* (α, β, σ) as an additional control. The coefficient of *Comove* reduces to 0.40 (t = 1.51) and becomes statistically insignificant. In column (6), we further add *IVOL*. Once *Comove* (α, β, σ) is included, controlling for *IVOL* has minimal impact on the *Comove* coefficient. In the last two columns, instead of using *Comove* as a continuous variable, we define a *High* and a *Low* dummy. *High* is a dummy that equals one for the stocks in the highest *Comove* quintile. *Low* is a dummy that equals one for the stocks in the lowest *Comove* quintile. The *Comove* quintiles are defined in the same way as UW. The difference between the coefficient of *High* and the coefficient of *Low* is similar to the high-minus-low *Comove* portfolio return. The results show that both the coefficient of *High* and the coefficient of *Low* are negative. The difference between them is minimal. If anything, the coefficient of *High* is more negative than that of *Low*.

Overall, the results in Table 6 show that *Comove* does not predict return once *Comove* (α, β, σ) is controlled for, suggesting that *Comove* does not contain any information about future stock returns beyond the known return predictors, such as beta, *IVOL*, and momentum. This finding is inconsistent with UW's interpretation that *Comove* predicts return because *Comove* underweights the dependence in extreme returns relative to beta and is a better perceived systematic risk measure.

3.6 The IVOL effect after controlling for Comove

In this section, we examine whether *Comove* can explain the *IVOL* effect. In theory, such a possibility exists. If so, we will not be able to differentiate the *IVOL* effect and the *Comove* effect. Hence, *Comove* may provide an interpretation for the *IVOL* effect. In Table 6, we have seen that, in Fama-MacBeth regressions, the *IVOL* effect remains strong after controlling for *Comove*. In this section, we focus on the portfolio approaches.

Table 7 reports that the *IVOL* effect is strong and continues to be strong after controlling for *Comove*. In all the analyses of the *IVOL* effect, we adopt the same method used to analyze *Comove*. In the first two columns, we report the regional-factor alphas and their *t* values for the low-minus-high *IVOL* portfolio. The same as in the analysis of *Comove*, we double sort by beta first and *IVOL* second. In the triple sort, we first sort all the stocks into beta terciles, then within each beta tercile, we sort stocks into *Comove* deciles, and then within each beta-*Comove* portfolio, we sort stocks into *IVOL* quintiles.

Table 7 shows that the *IVOL* effect is strong, consistent with Ang, Hodrick, Xing, and Zhang (2006, 2009). Out of all the 24 markets, the regional-factor alphas are positive except for Canada, Hong Kong, Indonesia, and Pakistan and are significant in 13 markets. The triple sort analysis yields very similar results. Adjustment with the *Comove* factor reduces the alpha from 0.42% to 0.35%, but it remains highly statistically significant.

4. Conclusions

Ungeheuer and Weber (UW) propose a *Comove* measure, the fraction of weekly stock returns that are of the same sign as the market, and document that, conditional on market beta, *Comove* positively predicts the cross-section of stock returns. Our analysis shows that after properly controlling for the idiosyncratic volatility effect, the *Comove*-return relationship disappears. For example, in the US, the long-short *Comove* portfolio's monthly alpha reduces from about 0.30% ($t > 3$) to a statistically and economically insignificant 0.12% (t = 1.55). Therefore, our results challenge their interpretation that the positive correlation between *Comove* and stock return is evidence for the CAPM.

References

Ang, Andrew, Robert Hodrick, Yuhang Xing, and Xiaoyan Zhang, 2006, The cross-section of volatility and expected returns, *Journal of Finance* 61: 259-299.

Ang, Andrew, Robert Hodrick, Yuhang Xing, and Xiaoyan Zhang, 2009, High idiosyncratic volatility and low returns: International evidence and further U.S. evidence, *Journal of Financial Economics* 91: 1-23.

Bali, Turan, Nusret Cakici, and Robert Whitelaw, 2011, Maxing out: Stocks as lotteries and the cross-section of expected returns, *Journal of Financial Economics* 99: 427-446.

Barberis, Nicholas, Lawrence Jin, and Baolian Wang, 2021, Prospect theory and stock market anomalies, *Journal of Finance* 76: 2639-2687.

Barillas, Francisco, and Jay Shanken, 2017, Which alpha? *Review of Financial Studies* 30: 1316-1338.

Boyer, Brian, Todd Mitton, and Keith Vorkink, 2010, Expected idiosyncratic skewness, *Review of Financial Studies* 23: 169-202.

Chinco, Alex, Samuel Hartzmark, and Abigail Sussman, 2021, A new test of risk factor relevance, *Journal of Finance* forthcoming.

Cooper, Michael, Huseyin Gulen, and Michael Schill, 2008, Asset growth and the cross-section of stock returns, *Journal of Finance* 63: 1609-1651.

Cramér, Harald, 1946, *Mathematical Methods of Statistics*. Princeton, NJ: Princeton University Press.

Davis, James, Eugene Fama, and Kenneth French, 2000, Characteristics, covariances, and average returns: 1929 to 1997, *Journal of Finance* 55: 389-406.

Enke, Benjamin, and Florian Zimmermann, 2019, Correlation neglect in belief formation, *Review of Economic Studies* 86: 313-332.

Fama, Eugene, 1998, Determining the number of priced state variables in the ICAPM, *Journal of Financial and Quantitative Analysis* 33: 217-231.

Fama, Eugene, and Kenneth French, 1992, The cross-section of expected stock returns, *Journal of Finance* 47: 427-465.

Fama, Eugene, and Kenneth French, 1993, Common risk factors in the returns on stocks and bonds, *Journal of Financial Economics* 33: 3-56.

Fama, Eugene, and Kenneth French, 2008, Average returns, B/M, and share issues, *Journal of Finance* 63: 2971-2995.

Fama, Eugene, and Kenneth French, 2012, Size, value, and momentum in international stock returns, *Journal of Financial Economics* 105: 457-472.

Fama, Eugene, and Kenneth French, 2015, A five-factor asset pricing model, *Journal of Financial Economics* 116: 1-22.

Fama, Eugene, and James MacBeth, 1973, Risk, return, and equilibrium: Empirical tests, *Journal of Political Economy* 81: 607-636.

Frazzini, Andrea, and Lasse Heje Pedersen, 2014, Betting against beta, *Journal of Financial Economics* 111: 1-25.

Jensen, Theis, Bryan Kelly, and Lasse Heje Pedersen, 2021, Is there a replication crisis in finance? *Journal of Finance* forthcoming.

Jennings, Dennis, Teresa Amabile, and Lee Ross, 1982, Informal covariation assessment: Data-based vs. theory-based judgments. In Daniel Kahneman, Paul Slovic, and Amos Tversky (Eds.), *Judgment Under Uncertainty: Heuristics and Biases*. Cambridge University Press.

Levitt, Steven, and John List, 2007, What do laboratory experiments measuring social preferences reveal about the real world? *Journal of Economic Perspectives* 21: 153-174.

Levy, Gilat, and Ronny Razin, 2015, Correlation neglect, voting behavior, and information aggregation, *American Economic Review* 105: 1634-1645.

Markowitz, Harry, 1952, Portfolio selection, *Journal of Finance* 7: 77-91.

Matthies, Ben, 2020, Biased assessment of comovement, working paper.

Newey, Whitney, and Kenneth West, 1987, A simple, positive semi-definite, heteroscedasticity and autocorrelation consistent covariance matrix, *Econometrica* 55: 703-708.

Novy-Marx, Robert, 2013, The other side of value: The gross profitability premium, *Journal of Financial Economics* 108: 1-28.

Sharpe, William, 1964, Capital asset prices: A theory of market equilibrium under conditions of risk, *Journal of Finance* 19: 425-442.

Shumway, Tyler, 1997, The delisting bias in CRSP data, *Journal of Finance* 52: 327-340.

Stambaugh, Robert, Jianfeng Yu, and Yu Yuan, 2015, Arbitrage asymmetry and the idiosyncratic volatility puzzle, *Journal of Finance* 70: 1903-1948.

Ungeheurer, Michael, and Martin Weber, 2021, The perception of dependence, investment decisions, and stock prices, *Journal of Finance* 76: 797-844.

Table 1. Sample stock markets, with returns ending in December 2020

Description: This table reports the stock markets in our sample: the United States, other G7 markets, other developed markets, and non-developed markets. Within each group, the markets are ranked by the average market capitalization over the sample period. Following Fama and French (2012), we group the markets into four regions: Asia Pacific ex Japan, Europe, Japan, and North America. *Start* is the first month with a valid observation. *Stocks* is the average number of stocks available. *Number of months* is the total number of months. *Index* is the local stock index we use to measure *Comove*.

Interpretation: The sample is comprehensive and covers 23 major financial markets.

Market	Developed	Region	Start	Stocks	Number of months	Local Index
United States	Yes	North America	196307	2,321	690	S&P 500
Other G7 markets						
Japan	Yes	Japan	198607	2,433	414	Nikkei 225
United Kingdom	Yes	Europe	198607	1,154	414	FTSE 100
France	Yes	Europe	199201	484	346	CAC 40
Germany	Yes	Europe	199401	546	323	DAX-30
Canada	Yes	North America	198506	824	427	TSX
Italy	Yes	Europe	200912	236	133	FTSE MIB
Other developed markets						
Hong Kong	Yes	Asia Pacific ex Japan	199311	875	326	Hang Seng
Australia	Yes	Asia Pacific ex Japan	200010	1,062	243	S&P ASX 200
Sweden	Yes	Europe	200008	347	245	OMX Stockholm 30
Singapore	Yes	Asia Pacific ex Japan	199702	400	267	Strait Times-Singapore
Israel	Yes	Europe	200611	284	170	Tel Aviv 25
Non-developed markets						
China	No	Asia Pacific ex Japan	200108	1,617	232	Shanghai SE Composite
India	No	Asia Pacific ex Japan	199510	1,350	303	303
South Korea	No	Asia Pacific ex Japan	199603	1,164	298	Korea Stock Exchange Composite
Taiwan	No	Asia Pacific ex Japan	199405	935	320	Taiwan Weighted
Indonesia	No	Asia Pacific ex Japan	201004	326	129	Jakarta Stock Exchange Composite
South Africa	No	Europe	200302	224	214	JSE/FTSE All Share
Malaysia	No	Asia Pacific ex Japan	199405	604	320	KLSE Composite
Thailand	No	Asia Pacific ex Japan	199304	362	314	The Stock Exchange of Thailand Index
Turkey	No	Europe	200204	281	224	ISE 100
Poland	No	Europe	200710	450	159	Warsaw W.I.G
Pakistan	No	Asia Pacific ex Japan	200601	280	148	Karachi S.E 100 Share

Table 2. The average monthly percentage excess returns on the *Comove* portfolios

Description: In this table, we report the performance of equal-weighted *Comove* portfolios. *Comove* is measured as the frequency of equally signed stock and market returns over the last 52 weeks. The market returns are measured based on the local market index. Each month, for each market, stocks are sorted into quintiles based on *beta*. Then, within each *beta* quintile, stocks are further sorted into quintiles based on *Comove*. *Beta* is measured using the last year's daily stock and value-weighted market returns. The returns of the five *Comove* portfolios over the next month are averaged across the five *beta* quintiles. We report the average monthly percentage excess return of the five *Comove* portfolios. We also report the excess return and the regional-factor model alphas of the high-*Comove* minus low-*Comove* long-short portfolio. In the last row, we aggregate the high-minus-low *Comove* portfolios across the 23 international markets, using the local total market capitalization as the weight. *t*-statistics are based on Newey and West (1987) standard errors with 12 lags. The bold typeface indicates statistical significance at the 5% level.

Interpretation: *Comove* is positively associated with future stock returns, replicating UW (2021) in the global sample.

	Low				High	High-Low			
Economy	*Comove*	2	3	4	*Comove*	Excess	*t*	Alpha	*t*
United States	0.495	0.686	0.755	0.802	0.807	**0.312**	**3.43**	**0.263**	**3.90**
Other G7 markets									
Japan	0.317	0.447	0.468	0.524	0.552	**0.236**	**1.95**	**0.244**	**2.64**
UK	0.348	0.488	0.598	0.597	0.669	**0.322**	**2.07**	0.231	1.50
France	0.387	0.572	0.650	0.677	0.737	**0.350**	**2.26**	**0.310**	**2.08**
Germany	–0.018	0.226	0.441	0.349	0.411	**0.428**	**2.66**	**0.481**	**3.40**
Canada	1.224	1.075	1.011	0.948	0.942	–0.282	–1.05	–0.443	–1.65
Italy	0.022	0.102	0.525	0.504	0.601	**0.579**	**2.15**	**0.581**	**2.17**
Other developed markets									
Hong Kong	0.908	0.725	1.043	0.719	0.896	–0.011	–0.03	–0.333	–0.94
Australia	1.462	1.307	0.915	1.147	0.958	–0.503	–1.67	–0.563	–1.97
Sweden	0.207	1.006	1.010	1.222	1.166	**0.959**	**3.57**	**0.960**	**3.27**
Singapore	0.808	0.854	0.810	0.706	0.901	0.093	0.41	0.134	0.60
Israel	1.003	0.787	1.134	0.908	1.034	0.030	0.14	0.107	0.47
Non-developed markets									
China	1.014	1.037	1.032	1.055	1.035	0.021	0.11	–0.213	–1.39
India	0.939	1.231	1.282	1.310	1.410	**0.471**	**2.34**	**0.478**	**2.00**
South Korea	0.548	0.684	0.885	1.272	1.328	**0.780**	**3.18**	0.386	1.65
Taiwan	0.286	0.436	0.426	0.704	0.656	**0.370**	**2.68**	**0.423**	**3.27**
Indonesia	1.315	0.859	0.822	1.001	1.049	–0.265	–0.73	–0.214	–0.51
South Africa	0.995	0.686	0.981	1.035	1.188	0.193	0.79	0.033	0.09
Malaysia	0.525	0.537	0.542	0.568	0.629	0.104	0.63	0.148	0.66
Thailand	0.851	1.100	0.953	0.838	0.974	0.123	0.52	0.248	1.57
Turkey	1.834	1.841	2.024	2.181	2.200	0.365	1.13	0.110	0.46
Poland	0.455	–0.020	0.141	0.029	0.185	–0.270	–0.66	–0.432	–1.46
Greece	–0.065	–0.197	0.117	0.138	0.325	0.390	0.91	–0.114	–0.19
Pakistan	1.517	1.333	1.273	1.250	1.199	–0.318	–0.89	–0.556	–1.72
International						**0.220**	**3.02**	**0.152**	**2.84**

Table 3. The characteristics of the *Comove* portfolios

Description: This table reports the differences in characteristics (moderate beta, extreme beta, and idiosyncratic volatility) of the high-*Comove* and the low-*Comove* portfolios. The *Comove* portfolios are constructed by controlling for beta, as in Table 2. Panel A reports the characteristics calculated based on the past twelve months' data, contemporaneous to the data used to calculate *Comove*. Panel B reports the characteristics calculated based on the twelve months' data following portfolio formation. To calculate moderate and extreme betas, for each twelve months estimation period, we group the days into two categories by the absolute value of the market return. The extreme market return days are the days with the 20% highest absolute market returns, and the remaining days are the moderate return days. Moderate beta is the beta estimated using the data of the moderate return days, and extreme beta is estimated using data of the extreme return days. In the US, idiosyncratic volatility (*IVOL*) is calculated relative to the Fama-French three-factor model. In the international data, *IVOL* is calculated relative to the local market factor. Reported *IVOL* is annualized by multiplying the standard deviation of daily return residuals by the square root of 252. We winsorize *IVOL* at the 1% and 99% levels by market. In the last row, we aggregate the high-minus-low *Comove* portfolios across the 23 international markets using the local total market capitalization as the weight. ***t***-statistics are based on Newey and West (1987) standard errors with 12 lags. The bold typeface indicates statistical significance at the 5% level.

Interpretation: Contemporaneously, *Comove* is more positively correlated with moderate beta than with extreme beta, suggesting that *Comove* underweights dependence in the tails. However, such an asymmetry does not persist in the future. *Comove* is strongly negatively correlated with contemporaneous and future idiosyncratic volatility.

Panel A. Contemporaneous characteristics

Economy	Moderate Beta	*t*	Extreme Beta	*t*	*IVOL*	*t*
United States	**0.098**	**8.77**	**0.037**	**8.13**	**–0.120**	**–19.11**
International	**0.080**	**26.27**	**0.035**	**24.78**	**–0.200**	**–30.06**

Panel B. Future characteristics

Economy	Moderate Beta	*t*	Extreme Beta	*t*	*IVOL*	*t*
United States	0.017	1.12	0.021	1.80	**–0.112**	**–17.42**
International	**0.123**	**26.02**	**0.116**	**29.27**	**–0.183**	**–28.16**

Table 4. Adjusting with an *IVOL* factor

Description: This table reports the alphas of the high-minus-low *Comove* long-short portfolio. The portfolios are equal-weighted. The *Comove* portfolios are constructed by controlling for beta, as in Table 2. We report the alphas from the regional factor model augmented with the *IVOL* factor. The *IVOL* factor is constructed based on a double sort: first by beta and then by *IVOL*, and is equal-weighted. In the last row, we aggregate the high-minus-low *Comove* portfolios across the 23 international markets, using the local total market capitalization as the weight. *t*-statistics are based on Newey and West (1987) standard errors with 12 lags. The bold typeface indicates statistical significance at the 5% level.

Interpretation: The high-minus-low *Comove* long-short portfolio has an alpha that is indistinguishable from zero once the *IVOL* factor is adjusted.

Economy	Alpha	*t*	MktRf	*t*	*IVOL* factor	*t*
United States	0.115	1.55	**0.119**	**6.33**	**0.387**	**6.39**
Other G7 markets						
Japan	0.154	1.60	**0.126**	**5.07**	**0.288**	**4.10**
UK	0.106	0.98	–0.010	–0.14	**0.382**	**10.88**
France	0.266	1.85	**0.296**	**3.26**	**0.133**	**2.14**
Germany	**0.312**	**2.44**	**0.200**	**2.82**	**0.18**	**3.77**
Canada	–0.239	–1.23	0.068	1.26	**0.477**	**8.79**
Italy	0.304	1.22	0.181	1.85	**0.255**	**4.72**
Other developed markets						
Hong Kong	–0.166	–0.81	0.070	0.60	0.330	1.22
Australia	**–0.826**	**–5.75**	0.035	0.31	**0.560**	**12.47**
Sweden	0.508	1.56	**0.212**	**3.31**	**0.410**	**4.99**
Singapore	–0.192	–1.25	0.001	0.01	**0.600**	**7.70**
Israel	–0.237	–1.15	0.053	1.14	**0.257**	**3.99**
Non-developed markets						
China	**–0.717**	**–3.32**	–0.012	–0.38	**0.363**	**3.73**
India	–0.102	–0.51	**0.067**	**3.51**	**0.514**	**7.94**
South Korea	–0.151	–0.75	**0.074**	**2.89**	**0.436**	**8.93**
Taiwan	**0.390**	**2.89**	0.068	1.32	0.076	1.04
Indonesia	–0.181	–0.47	0.122	1.52	**0.292**	**4.06**
South Africa	–0.327	–1.40	0.014	0.30	**0.417**	**6.97**
Malaysia	0.062	0.32	**0.149**	**7.63**	**0.445**	**11.72**
Thailand	0.190	1.16	**0.228**	**7.92**	**0.373**	**4.53**
Turkey	–0.280	–1.21	0.024	1.08	**0.501**	**6.03**
Poland	**–0.607**	**–2.85**	0.068	1.49	**0.389**	**7.31**
Greece	–0.271	–0.78	0.017	0.36	**0.482**	**6.78**
Pakistan	–0.464	–1.95	**0.113**	**2.41**	**0.415**	**6.89**
International	0.014	0.29	**0.092**	**2.36**	**0.34**	**9.18**

Table 5. Triple sorts

Description: In this table, we report the performance of equal-weighted *Comove* portfolios in a triple-sort analysis. Each month, for each market, stocks are sorted into terciles based on *beta*. Then, within each *beta* tercile, stocks are further sorted into deciles based on idiosyncratic volatility (*IVOL*). Then, within each beta-*IVOL* portfolio, stocks are further sorted into *Comove* quintiles. The returns of the five *Comove* portfolios over the next month are averaged across the 30 *beta-IVOL* quintiles. We report the excess return of the five *Comove* portfolios, We also report the excess return and the regional-factor model alphas of the high-*Comove* minus low-*Comove* long-short portfolio. In the last row, we aggregate the high-minus-low *Comove* portfolios across the 23 international markets, using the local total market capitalization as the weight. *t*-statistics are based on Newey and West (1987) standard errors with 12 lags. The bold typeface indicates statistical significance at the 5% level.

Interpretation: The long-short *Comove* portfolio return spread when idiosyncratic volatility is controlled for in a triple-sort analysis.

	Low				High	High-Low			
Economy	*Comove*	2	3	4	*Comove*	Excess	*t*	Alpha	*t*
United States	0.631	0.648	0.707	0.753	0.797	**0.165**	**2.26**	0.113	1.66
Other G7 markets									
Japan	0.367	0.421	0.459	0.531	0.517	0.150	1.63	**0.147**	**2.02**
UK	0.521	0.458	0.582	0.489	0.645	0.124	1.08	0.135	1.15
France	0.472	0.645	0.572	0.653	0.588	0.116	0.70	0.114	0.76
Germany	0.165	0.303	0.295	0.407	0.178	0.013	0.08	0.067	0.44
Canada	1.222	1.089	0.904	0.982	0.969	–0.254	–1.26	–0.423	–1.82
Italy	–0.105	0.315	0.313	0.683	0.484	**0.589**	**2.49**	**0.681**	**3.56**
Other developed markets									
Hong Kong	1.019	0.790	0.715	0.894	0.904	–0.116	–0.38	–0.364	–0.95
Australia	1.402	1.378	1.225	1.014	0.804	**–0.598**	**–3.63**	**–0.609**	**–4.05**
Sweden	0.741	0.971	0.888	0.976	1.064	0.323	1.44	**0.444**	**2.11**
Singapore	0.987	0.924	0.642	0.763	0.785	–0.201	–1.34	–0.244	–1.48
Israel	0.917	1.134	0.934	0.893	0.966	0.049	0.22	0.018	0.10
Non-developed markets									
China	1.114	1.123	1.007	0.981	0.945	–0.169	–0.95	**–0.389**	**–2.54**
India	1.179	1.196	1.288	1.163	1.309	0.130	0.77	0.010	0.05
South Korea	0.846	0.851	0.882	0.974	1.197	0.351	1.78	0.170	0.78
Taiwan	0.291	0.403	0.539	0.560	0.634	**0.344**	**2.62**	**0.368**	**3.13**
Indonesia	1.233	0.805	0.947	0.802	1.050	–0.183	–0.60	–0.161	–0.47
South Africa	1.141	0.982	1.096	0.820	0.862	–0.279	–1.15	–0.514	–1.42
Malaysia	0.549	0.510	0.612	0.552	0.561	0.013	0.09	0.097	0.49
Thailand	0.976	0.961	0.913	0.923	0.974	–0.002	–0.01	–0.091	–0.44
Turkey	1.958	1.888	1.975	2.065	2.023	0.065	0.20	–0.156	–0.50
Poland	0.259	0.325	0.386	–0.326	0.100	–0.159	–0.73	–0.131	–0.76
Greece	–0.062	0.269	–0.116	–0.034	0.105	0.167	0.61	–0.281	–0.56
Pakistan	1.613	1.448	1.161	1.284	1.460	–0.154	–0.42	–0.181	–0.54
International						0.061	0.84	0.015	0.29

Table 6. Fama-MacBeth regressions

Description: This table reports the results of Fama-MacBeth regressions using the US sample with the control of *Comove* (α, β, σ), which is a pseudo *Comove* measure under the assumption of no asymmetry between the dependence in moderate returns and the dependence in extreme returns. The dependent variable is the monthly percentage return on a stock. *Comove* is measured as the frequency of equally signed stock and market returns over the last 52 weeks. *High* is a dummy that equals one for the stocks in the highest *Comove* quintile. *Low* is a dummy that equals one for the stocks in the lowest *Comove* quintile. *Beta* is the factor loading on the market factor from a CAPM one-factor regression estimated based on a one-year rolling window of daily data. *Ln*(*size*) is the log of a firm's equity market capitalization. *Ln*(*B/M*) is the log of a firm's book-to-market ratio. The book-to-market ratio is calculated following Fama and French (2008). We fill the missing book equity values with data from Davis, Fama, and French (2000). $Return_{t-12,t-2}$ is the cumulative stock return from month *t*–12 to *t*–2. *Gross Profit* is equal to revenue minus the cost of goods sold divided by total assets (Novy-Marx, 2013). *Asset Growth* is the percentage of total asset growth between two consecutive fiscal years (Cooper, Gulen, and Schill, 2008). *IVOL* is the standard deviation of residuals from the Fama and French (1993) model, estimated using the previous month's daily returns. The sample period is from July 1963 to December 2020. *t*-statistics, in parentheses, are Newey-West adjusted with twelve lags, and bold typeface indicates a coefficient significant at the 5% level.

Interpretation: Controlling for *Comove* (α, β, σ) renders the coefficient of *Comove* insignificant. Controlling for *Comove* (α, β, σ) is nothing more than controlling for α (CAPM alpha in the past 12 months), β (beta), and σ (idiosyncratic volatility), although nonlinearly.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Comove	**1.419**	**0.935**			0.398	0.354		
	(4.64)	**(3.44)**			(1.51)	(1.36)		
High							–0.054	–0.050
							(–1.86)	(–1.74)
Low							–0.053	–0.026
							(–1.43)	(–0.72)
Comove (α, β, σ)			**3.166**	**2.043**	**2.765**	**1.668**	**3.175**	**2.122**
			(5.15)	**(3.80)**	**(4.29)**	**(2.93)**	**(5.14)**	**(3.87)**
beta	–0.050	0.128	–0.135	0.063	–0.135	0.064	–0.145	0.050
	(–0.32)	(0.88)	(–0.80)	(0.41)	(–0.81)	(0.41)	(–0.87)	(0.33)
Ln(size)	**–0.076**	**–0.136**	**–0.102**	**–0.147**	**–0.101**	**–0.146**	**–0.100**	**–0.146**
	(–2.02)	**(–3.92)**	**(–2.77)**	**(–4.20)**	**(–2.73)**	**(–4.16)**	**(–2.73)**	**(–4.16)**
Ln(B/M)	**0.186**	**0.160**	**0.181**	**0.160**	**0.179**	**0.158**	**0.180**	**0.159**
	(3.19)	**(2.81)**	**(3.10)**	**(2.81)**	**(3.07)**	**(2.78)**	**(3.09)**	**(2.81)**
$Ret_{t-12,\,t-2}$	**0.791**	**0.780**	**0.787**	**0.782**	**0.789**	**0.783**	**0.792**	**0.787**
	(5.38)	**(5.40)**	**(5.30)**	**(5.36)**	**(5.34)**	**(5.41)**	**(5.36)**	**(5.43)**
Gross Profit	**0.539**	**0.520**	**0.527**	**0.510**	**0.521**	**0.504**	**0.522**	**0.506**
	(3.97)	**(3.81)**	**(3.88)**	**(3.76)**	**(3.84)**	**(3.72)**	**(3.85)**	**(3.73)**
Asset Growth	**–0.342**	**–0.332**	**–0.331**	**–0.325**	**–0.328**	**–0.323**	**–0.323**	**–0.317**
	(–3.89)	**(–3.80)**	**(–3.81)**	**(–3.75)**	**(–3.80)**	**(–3.74)**	**(–3.74)**	**(–3.68)**
IVOL		**–0.264**		**–0.246**		**–0.247**		**–0.246**
		(–8.10)		**(–8.05)**		**(–8.07)**		**(–8.05)**
Average R^2	7.88%	8.30%	7.99%	8.37%	8.12%	8.50%	8.18%	8.56%
Average N	1,906	1,906	1,906	1,906	1,906	1,906	1,906	1,906
T	690	690	690	690	690	690	690	690

Table 7. The idiosyncratic volatility effect

Description: This table reports the results of the idiosyncratic volatility (*IVOL*) effect. The portfolios are equal-weighted. In double sort, stocks are sorted into beta quintiles and then *IVOL* quintiles. The returns of the five *IVOL* portfolios over the next month are averaged across the five beta quintiles. For the double sort, we report the alpha of the low-minus-high *IVOL* portfolio alphas based on the regional factor model and the alphas based on the regional alpha model augmented with a *Comove* factor. In the triple sort analysis, stocks were first sorted into beta terciles. Then within each beta tercile, stocks are sorted into *Comove* deciles. Then, within each beta-*Comove* portfolio, stocks are further sorted into *IVOL* quintiles. The returns of the five *IVOL* portfolios over the next month are averaged across the 30 beta-*Comove* portfolios. For the triple sort, we report the alpha of the low-minus-high *IVOL* portfolio alphas based on the regional factor model. In the *MktRf* column, we report the loading on the market factor. In the *Comove factor* column, we report the loading on the *Comove* factor. In the last row, we aggregate the low-minus-high *IVOL* portfolios across the 23 international markets, using the local total market capitalization as the weight. *t*-statistics are based on Newey and West (1987) standard errors with 12 lags. The bold typeface indicates statistical significance at the 5% level.

Interpretation: The *IVOL*-return relationship is robust after controlling for the *Comove* effect through the adjustment of a *Comove* factor or in a triple-sort analysis.

	Double sort		Double sort adjusted with a Comove factor						Triple sort	
Economy	Alpha	*t*	Alpha	*t*	MktRf	*t*	Comove factor	*t*	Alpha	*t*
United States	**0.383**	**4.10**	**0.263**	**3.19**	**–0.170**	**–6.91**	**0.459**	**4.75**	**0.320**	**3.69**
Other G7 markets										
Japan	**0.314**	**3.06**	**0.186**	**2.15**	**–0.293**	**–7.08**	**0.522**	**3.92**	**0.288**	**3.02**
UK	0.328	1.42	0.128	0.80	–0.207	–1.80	**0.867**	**7.47**	0.188	0.90
France	0.327	1.57	0.220	1.15	–0.186	–1.55	**0.345**	**2.77**	0.244	1.16
Germany	**0.940**	**3.76**	**0.722**	**3.64**	**–0.297**	**–3.04**	**0.452**	**4.27**	**0.703**	**2.70**
Canada	–0.429	–1.40	–0.025	–0.10	**–0.378**	**–5.03**	**0.911**	**11.23**	–0.167	–0.70
Italy	**1.086**	**5.65**	**0.796**	**4.01**	**–0.279**	**–2.00**	**0.500**	**4.38**	**0.920**	**3.74**
Other developed markets										
Hong Kong	–0.505	–1.16	–0.372	–0.86	**–0.276**	**–2.34**	0.398	1.26	–0.456	–1.04
Australia	0.470	1.26	1.026	5.77	–0.040	–0.25	**0.988**	**14.99**	**0.598**	**1.98**
Sweden	**1.105**	**4.67**	0.472	2.12	–0.161	–1.58	**0.659**	**6.62**	**0.982**	**4.41**
Singapore	**0.542**	**2.13**	0.447	2.70	–0.092	–0.94	**0.709**	**11.66**	0.354	1.68
Israel	**1.336**	**3.96**	1.279	4.56	–0.034	–0.42	**0.533**	**4.49**	**1.318**	**4.48**
Non-developed markets										
China	**1.390**	**5.11**	**1.493**	**5.80**	**–0.074**	**–2.66**	**0.481**	**3.95**	**1.387**	**5.18**
India	**1.129**	**4.70**	**0.679**	**3.53**	**–0.180**	**–5.53**	**0.942**	**9.73**	**0.979**	**4.20**
South Korea	**1.233**	**2.94**	**0.855**	**2.67**	**–0.162**	**–3.34**	**0.978**	**9.43**	**1.099**	**2.64**
Taiwan	**0.438**	**1.99**	0.385	1.62	**–0.334**	**–4.52**	0.127	0.94	0.343	1.58
Indonesia	–0.113	–0.36	–0.021	–0.07	0.006	0.07	**0.431**	**4.02**	–0.027	–0.06
South Africa	**0.861**	**2.48**	**0.843**	**4.06**	0.018	0.35	**0.543**	**5.62**	**0.967**	**3.31**
Malaysia	0.193	0.73	0.055	0.23	**–0.239**	**–5.23**	**0.938**	**8.90**	0.238	1.03
Thailand	0.156	0.53	–0.054	–0.19	**–0.292**	**–3.82**	**0.847**	**3.67**	0.178	0.58
Turkey	**0.778**	**2.86**	**0.722**	**3.11**	**0.053**	**1.98**	**0.517**	**8.37**	**1.109**	**3.27**
Poland	0.450	0.87	**0.834**	**2.68**	–0.141	–1.37	**0.890**	**3.18**	0.591	1.27
Greece	0.327	0.50	0.410	1.30	**–0.215**	**–3.23**	**0.729**	**3.95**	0.231	0.38
Pakistan	–0.222	–0.49	0.263	0.75	**–0.262**	**–3.44**	**0.872**	**8.40**	0.035	0.07
International	**0.420**	**5.26**	**0.348**	**5.03**	**–0.204**	**–4.56**	**0.608**	**9.18**	**0.460**	**5.83**

Internet Appendix for

"Why Do the Frequencies of Comovement with the Market Predict the Cross-Section of Stock Returns?"

Peixin Li and Baolian Wang

Table IA1 reports the average *Comove* of the *Comove* portfolios.

Table IA2 reports the summary statistics of the US sample. Except for $Return_t$, These statistics are very similar to those reported in Panel A of Table IA. IX of UW's Internet Appendix. UW report a mean $Return_t$ of 0.0054, which is about 19 basis points lower than ours. The discrepancy is mainly driven by our differences in excluding microcap stocks. When excluding the microcap stocks, UW compare a stock's market capitalization at the end of month t –1 with the NYSE breakpoint at the end of month t. (We confirmed this with the authors in private conversations.) We compare a stock's market capitalization at the end of month t –1 with the NYSE breakpoint at the end of month t. Hence, they exclude more firms in the months with higher market returns and fewer firms in the months with lower market returns. Out of the 19 basis points difference in mean $Return_t$, the difference in handling the microcap stocks explains about 15 basis points. The remaining can be attributed to the sample period difference. Our sample includes the last five years that have relatively high returns.

Tables IA3 to IA6 report the results based on the value-weighted portfolios. These tables correspond to Tables 2, 4, 5, and 6, respectively. In Tables 2, 4, 5, and 6, the portfolios are equal-weighted.

Table IA7 reports the characteristics (i.e., moderate beta, extreme beta, and idiosyncratic volatility) of the *Comove* portfolios for each individual economy.

Table IA8 reports the characteristics (i.e., moderate beta, extreme beta, and idiosyncratic volatility) of the *Comove* portfolios. Unlike Table 3, the extreme market return days are the days with the 10% highest absolute market returns, and the remaining days are the moderate return days. Extreme beta is estimated using the extreme market return days, and moderate beta is estimated using the moderate market return days. Instead, in Table 3, the extreme market return days are the days with the 20% highest absolute market returns.

Table I9 reports the alphas of the high-minus-low *Comove* long-short portfolio. We report the alphas from a model with the local market factor plus the *IVOL* factor.

Table IA1. Average *Comove* of the *Comove* portfolio

This table presents the mean of *Comove* for each *Comove* portfolio. *Comove* is measured as the frequency of equally signed stock and market returns over the last 52 weeks. The market returns are measured based on the local market index. Each month, for each market, stocks are sorted into quintiles based on *beta*. Then, within each *beta* quintile, stocks are further sorted into quintiles based on *Comove*. *Beta* is measured using the last year's daily stock and value-weighted market returns. The average *Comove* of the five *Comove* portfolios is averaged across the five *beta* quintiles. We report the average *Comove* of the five *Comove* portfolios and the difference in *Comove* between the high-*Comove* and the low-*Comove* portfolios. *t*-statistics are based on Newey and West (1987) standard errors with 12 lags. The bold typeface indicates statistical significance at the 5% level.

						High-Low	
Economy	Low Comove	2	3	4	High Comove	Mean	t-value
United States	0.521	0.592	0.633	0.674	0.736	**0.215**	**97.74**
Other G7 markets							
Japan	0.507	0.579	0.621	0.662	0.724	**0.217**	**86.06**
United Kingdom	0.397	0.500	0.558	0.612	0.693	**0.296**	**45.13**
France	0.444	0.528	0.574	0.618	0.683	**0.239**	**120.29**
Germany	0.431	0.512	0.560	0.606	0.675	**0.244**	**77.77**
Canada	0.381	0.481	0.534	0.584	0.659	**0.277**	**34.52**
Italy	0.527	0.595	0.636	0.677	0.739	**0.212**	**51.54**
Other developed markets							
Hong Kong	0.464	0.539	0.584	0.630	0.705	**0.241**	**100.94**
Australia	0.386	0.466	0.518	0.572	0.655	**0.269**	**58.44**
Sweden	0.471	0.544	0.591	0.637	0.704	**0.233**	**61.50**
Singapore	0.426	0.509	0.560	0.609	0.686	**0.260**	**41.53**
Israel	0.484	0.549	0.590	0.629	0.688	**0.204**	**130.12**
Non-developed markets							
China	0.615	0.676	0.712	0.748	0.803	**0.189**	**53.14**
India	0.513	0.579	0.618	0.657	0.719	**0.206**	**99.30**
South Korea	0.512	0.576	0.616	0.655	0.716	**0.203**	**105.17**
Taiwan	0.550	0.614	0.652	0.689	0.747	**0.197**	**77.60**
Indonesia	0.421	0.504	0.551	0.596	0.663	**0.242**	**71.15**
South Africa	0.405	0.498	0.550	0.598	0.667	**0.263**	**42.54**
Malaysia	0.477	0.550	0.592	0.633	0.697	**0.220**	**43.64**
Thailand	0.488	0.562	0.606	0.648	0.710	**0.222**	**96.09**
Turkey	0.545	0.615	0.658	0.698	0.758	**0.213**	**75.00**
Poland	0.425	0.507	0.553	0.597	0.664	**0.239**	**33.12**
Greece	0.527	0.593	0.635	0.678	0.744	**0.217**	**43.71**
Pakistan	0.474	0.554	0.601	0.646	0.717	**0.242**	**41.21**
International						**0.236**	**95.50**

Table IA2. Summary statistics of the US sample

In this table, we report the summary statistics for our US sample. *Comove* is defined as the frequency of equally signed weekly stock and market (S&P 500) returns during the last 52 weeks. $Return_t$ is the monthly excess stock return. *Ln*(*size*) is the log of a firm's equity market capitalization. *Ln*(*B/M*) is the log of a firm's book-to-market ratio. The book-to-market ratio is calculated following Fama and French (2008). We fill the missing book equity values with data from Davis, Fama, and French (2000). $Return_{t-12,t-2}$ is the cumulative stock return from month t–12 to t–2. *Beta* is the factor loading on the market factor from a CAPM one-factor regression estimated based on a one-year rolling window of daily data. *IVOL* is the standard deviation of residuals from the Fama and French (1993) model, estimated using the previous month's daily returns. *Min* is a stock's minimum daily return over the previous month, multiplied by –1. *Max* is a stock's maximum daily return over the previous month. The statistics are based on pooled observations of all US common stocks traded on the NYSE, Amex, and NASDAQ. We exclude stocks whose price falls below $1 or whose market capitalization falls below the 10th NYSE-percentile in the month before portfolio formation. The sample period is from July 1963 to December 2020.

Variable	Mean	Median	Std. Dev.	P10	P90	N
Comove	0.6287	0.6226	0.0961	0.5094	0.7547	1,601,619
$Return_t$	0.0073	0.0031	0.1326	–0.1275	0.1432	1,601,619
Ln(size)	20.0289	19.8632	1.7338	17.9291	22.3595	1,601,619
Ln(B/M)	–0.7084	–0.6165	0.9158	–1.8492	0.3111	1,340,585
$Return_{t-12,t-2}$	0.2102	0.1123	0.6842	–0.3080	0.7327	1,601,619
Beta	0.9600	0.9052	0.5580	0.2797	1.7091	1,601,619
IVOL	0.0199	0.0165	0.0127	0.0078	0.0363	1,601,614
Min	0.0468	0.0370	0.0378	0.0163	0.0858	1,601,618
Max	0.0560	0.0426	0.0530	0.0184	0.1053	1,601,618

Table IA3. The *Comove* portfolios – value-weighted

In this table, we report the performance of *Comove* portfolios. The portfolios are value-weighted. *Comove* is measured as the frequency of equally signed stock and market returns over the last 52 weeks. The market returns are measured based on the local market index. Each month, for each market, stocks are sorted into quintiles based on *beta*. Then, within each *beta* quintile, stocks are further sorted into quintiles based on *Comove*. *Beta* is measured using the last year's daily stock and value-weighted market returns. The returns of the five *Comove* portfolios over the next month are averaged across the five *beta* quintiles. We report the excess return of the five *Comove* portfolios. We also report the excess return and the regional-factor model alphas of the high-*Comove* minus low-*Comove* long-short portfolio. In the last row, we aggregate the high-minus-low *Comove* portfolios across the 23 international markets, using the local total market capitalization as the weight. *t*-statistics are based on Newey and West (1987) standard errors with 12 lags. The bold typeface indicates statistical significance at the 5% level.

	Low				High	High-Low			
Economy	Comove	2	3	4	Comove	Excess	*t*	Alpha	*t*
United States	0.510	0.568	0.572	0.619	0.580	0.071	0.70	0.142	1.52
Other G7 markets									
Japan	0.154	0.350	0.294	0.396	0.339	0.185	1.29	0.218	1.74
UK	0.287	0.514	0.690	0.547	0.521	**0.234**	**2.06**	0.150	1.15
France	0.556	0.622	0.660	0.713	0.827	**0.271**	**1.97**	0.257	1.90
Germany	0.058	0.362	0.515	0.478	0.687	**0.628**	**3.37**	**0.731**	**3.97**
Canada	0.711	0.694	0.595	0.638	0.708	–0.002	–0.01	0.019	0.07
Italy	0.083	0.680	0.644	0.526	0.696	**0.613**	**2.38**	**0.760**	**3.32**
Other developed markets									
Hong Kong	0.416	0.527	0.637	0.591	0.600	0.185	0.65	–0.023	–0.10
Australia	1.006	1.060	0.854	0.997	0.888	–0.118	–0.39	–0.224	–0.83
Sweden	0.641	1.098	1.063	1.238	1.001	0.360	1.11	0.505	1.53
Singapore	0.755	0.762	0.714	0.678	0.851	0.095	0.30	0.304	1.37
Israel	1.053	0.884	0.718	0.739	1.180	0.127	0.47	0.237	0.91
Non-developed markets									
China	0.981	0.960	0.876	0.739	0.841	–0.140	–0.63	**–0.608**	**–3.02**
India	0.674	1.202	0.979	1.041	1.115	0.441	1.57	0.473	1.45
South Korea	0.394	0.285	0.368	0.837	1.044	**0.650**	**2.25**	0.090	0.27
Taiwan	0.257	0.255	0.364	0.866	0.613	0.356	1.81	**0.399**	**2.06**
Indonesia	0.355	0.309	0.580	0.602	0.632	0.277	0.71	0.248	0.57
South Africa	0.798	0.836	1.046	1.132	1.145	0.347	1.31	0.384	1.13
Malaysia	0.094	0.425	0.363	0.566	0.464	0.370	1.88	**0.610**	**2.25**
Thailand	0.540	0.703	1.002	0.577	0.898	0.358	1.20	0.440	1.55
Turkey	1.509	1.511	1.413	1.847	1.710	0.201	0.52	0.172	0.54
Poland	0.323	–0.472	–0.120	0.183	0.288	–0.035	–0.07	–0.161	–0.47
Greece	0.174	–0.025	0.339	0.341	0.061	–0.113	–0.18	–0.515	–0.62
Pakistan	1.497	1.209	0.735	0.988	0.781	–0.716	–1.32	**–1.133**	**–2.36**
International						0.239	2.74	0.203	3.01

Table IA4. Adjusting with an *IVOL* factor – value-weighted

This table reports the alphas of the high-minus-low *Comove* long-short portfolio. The portfolios are value-weighted. The *Comove* portfolios are constructed by controlling for beta, as in Table 2. We report the alphas from a model with the local market factor plus the *IVOL* factor (Panel A) and the alphas from the regional factor model plus the *IVOL* factor (Panel B). The *IVOL* factor is constructed based on a double sort: first by beta and then by *IVOL*, and is value-weighted. In the last row, we aggregate the high-minus-low *Comove* portfolios across the 23 international markets, using the local total market capitalization as the weight. *t*-statistics are based on Newey and West (1987) standard errors with 12 lags. The bold typeface indicates statistical significance at the 5% level.

	Panel A. CAPM + IVOL factor						Panel B. FF5 + IVOL factor					
Economy	Alpha	*t*	MktRf	*t*	*IVOL* factor	*t*	Alpha	*t*	MktRf	*t*	*IVOL* factor	*t*
United States	–0.112	–1.58	**0.127**	**2.99**	**0.463**	**10.68**	0.026	0.28	**0.095**	**3.61**	**0.380**	**3.99**
Other G7 markets												
Japan	0.228	1.75	**0.100**	**3.41**	–0.055	–0.70	0.204	1.63	**0.126**	**3.94**	0.094	1.10
UK	0.107	0.84	–0.107	–1.14	0.094	1.80	0.087	0.89	**0.105**	**3.14**	**0.253**	**5.67**
France	0.244	1.80	**0.312**	**3.23**	0.050	1.15	0.122	0.87	**0.122**	**5.53**	**0.095**	**2.55**
Germany	**0.695**	**3.59**	0.175	1.28	0.031	0.72	**0.377**	**2.59**	**0.135**	**4.67**	**0.097**	**2.06**
Canada	–0.139	–0.53	–0.055	–0.74	**0.353**	**6.25**	0.017	0.08	–0.017	–0.41	**0.377**	**7.96**
Italy	**0.556**	**3.27**	0.198	1.25	**0.182**	**2.31**	**0.603**	**4.46**	**0.152**	**3.51**	**0.212**	**2.91**
Other developed markets												
Hong Kong	–0.087	–0.50	0.110	1.56	**0.482**	**8.90**	–0.220	–1.34	**0.164**	**5.43**	**0.639**	**15.81**
Australia	**–0.540**	**–2.51**	–0.031	–0.17	**0.363**	**6.78**	**–0.598**	**–4.03**	–0.012	–0.36	**0.488**	**12.56**
Sweden	0.296	0.92	0.089	1.03	**0.339**	**6.52**	–0.306	–1.25	0.060	1.78	**0.391**	**8.21**
Singapore	0.076	0.37	–0.097	–0.60	**0.397**	**5.08**	–0.070	–0.36	0.013	0.41	**0.442**	**6.75**
Israel	0.113	0.45	**0.199**	**2.74**	**0.124**	**1.99**	–0.020	–0.09	**0.089**	**2.75**	**0.138**	**2.33**
Non-developed markets												
China	**–0.834**	**–3.68**	0.011	0.28	**0.248**	**1.99**	–0.397	–1.45	0.033	0.97	**0.411**	**3.31**
India	0.045	0.16	0.051	1.28	**0.334**	**5.85**	0.120	0.63	**0.072**	**2.91**	**0.328**	**6.12**
South Korea	–0.045	–0.14	0.031	0.49	**0.321**	**4.76**	–0.099	–0.36	**0.102**	**4.80**	**0.382**	**6.85**
Taiwan	0.355	1.89	**0.171**	**2.06**	**0.187**	**2.13**	0.244	1.53	0.022	0.67	**0.277**	**3.42**
Indonesia	0.048	0.12	0.152	1.07	**0.209**	**4.33**	0.005	0.02	0.121	1.84	**0.241**	**5.35**
South Africa	0.196	0.67	–0.074	–0.85	0.139	1.62	–0.071	–0.32	**0.098**	**2.90**	0.163	1.75
Malaysia	**0.625**	**2.12**	**0.285**	**6.70**	**0.293**	**5.64**	0.061	0.42	**0.144**	**2.99**	**0.357**	**6.88**
Thailand	0.319	1.36	**0.121**	**2.94**	**0.320**	**3.57**	0.302	1.38	**0.151**	**6.38**	**0.257**	**3.53**
Turkey	0.184	0.60	0.039	0.90	**0.216**	**3.83**	–0.002	–0.01	0.014	0.48	**0.213**	**4.40**
Poland	–0.729	–1.86	–0.056	–1.09	**0.507**	**3.73**	–0.184	–0.49	0.044	1.63	**0.364**	**2.43**
Greece	–0.489	–0.78	0.020	0.22	**0.393**	**3.69**	**–0.594**	**–2.02**	**0.096**	**3.28**	**0.492**	**9.47**
Pakistan	**–0.956**	**–2.42**	–0.062	–0.85	**0.322**	**6.72**	–0.395	–1.12	0.018	0.43	**0.333**	**8.19**
International	0.082	1.10	**0.082**	**2.93**	**0.262**	**6.82**	0.119	1.74	0.070	1.53	**0.185**	**4.44**

Table IA5. Triple sorts – value-weighted

In this table, we report the performance of *Comove* portfolios in a triple-sort analysis. The portfolios are value-weighted. Each month, for each market, stocks are sorted into terciles based on *beta*. Then, within each *beta* tercile, stocks are further sorted into quintiles based on idiosyncratic volatility (*IVOL*). Then, within each beta-*IVOL* portfolio, stocks are further sorted into *Comove* quintiles. The returns of the five *Comove* portfolios over the next month are averaged across the 30 *beta*-*IVOL* quintiles. We report the excess return of the five *Comove* portfolios. We also report the excess return and the regional-factor model alphas of the high-*Comove* minus low-*Comove* long-short portfolio. In the last row, we aggregate the high-minus-low *Comove* portfolios across the 23 international markets, using the local total market capitalization as the weight. *t*-statistics are based on Newey and West (1987) standard errors with 12 lags. The bold typeface indicates statistical significance at the 5% level.

	Low				High	High-Low			
Economy	Comove	2	3	4	Comove	Excess	*t*	Alpha	*t*
United States	0.564	0.496	0.595	0.575	0.638	0.074	0.89	0.085	1.10
Other G7 markets									
Japan	0.230	0.278	0.312	0.357	0.370	0.140	1.27	0.166	1.65
UK	0.516	0.495	0.577	0.413	0.598	0.082	0.76	0.109	0.98
France	0.476	0.639	0.605	0.702	0.647	0.170	1.10	0.193	1.24
Germany	0.065	0.229	0.252	0.215	0.189	0.124	0.67	0.196	1.63
Canada	0.793	0.722	0.616	0.674	0.645	–0.148	–0.84	–0.272	–1.41
Italy	–0.062	0.305	0.387	0.641	0.513	**0.574**	**2.46**	**0.662**	**3.42**
Other developed markets									
Hong Kong	0.644	0.463	0.370	0.669	0.764	0.120	0.53	–0.108	–0.46
Australia	1.067	0.943	0.849	0.647	0.634	**–0.433**	**–2.03**	**–0.391**	**–2.13**
Sweden	0.718	0.924	0.871	0.909	1.003	0.285	1.34	0.427	1.89
Singapore	0.891	0.893	0.593	0.722	0.737	–0.154	–0.90	–0.199	–1.06
Israel	0.893	0.990	0.817	0.846	0.860	–0.033	–0.15	–0.069	–0.38
Non-developed markets									
China	1.071	0.986	0.841	0.828	0.765	–0.305	–1.48	–0.677	–4.07
India	0.817	0.879	0.881	0.834	1.011	0.194	0.92	0.195	0.84
South Korea	0.371	0.291	0.411	0.561	0.783	0.412	1.72	0.088	0.32
Taiwan	0.235	0.291	0.433	0.463	0.533	0.298	1.80	0.278	1.80
Indonesia	1.037	0.716	0.662	0.551	0.936	–0.100	–0.29	–0.102	–0.25
South Africa	1.114	0.890	1.056	0.801	0.863	–0.251	–0.99	–0.497	–1.32
Malaysia	0.337	0.314	0.485	0.502	0.511	0.174	1.08	0.344	1.59
Thailand	0.928	0.843	0.906	0.924	0.940	0.012	0.04	–0.072	–0.29
Turkey	1.918	1.674	1.789	1.859	1.947	0.029	0.09	–0.112	–0.36
Poland	0.194	–0.029	0.022	–0.399	–0.185	–0.379	–1.89	**–0.383**	**–2.03**
Greece	–0.082	0.151	–0.155	–0.081	0.148	0.230	0.79	–0.215	–0.41
Pakistan	1.552	1.375	1.025	1.237	1.357	–0.194	–0.50	–0.260	–0.70
International						0.086	1.14	0.060	1.13

Table IA6. The idiosyncratic volatility effect – value-weighted

This table reports the results of the idiosyncratic volatility (*IVOL*) effect. The portfolios are value-weighted. In the double sort analysis, the stocks are sorted into beta quintiles and then *IVOL* quintiles. The returns of the five *IVOL* portfolios over the next month are averaged across the five beta quintiles. For the double sort, we report the alpha of the low-minus-high *IVOL* portfolio alphas based on the regional factor model and the alphas based on the regional alpha model augmented with a *Comove* factor. In the triple sort analysis, stocks were first sorted into beta terciles. Then within each beta tercile, stocks are sorted into *Comove* deciles. Then, within each beta-*Comove* portfolio, stocks are further sorted into *IVOL* quintiles. The returns of the five *IVOL* portfolios over the next month are averaged across the 30 beta-*Comove* portfolios. For the triple sort, we report the alpha of the low-minus-high *IVOL* portfolio alphas based on the regional factor model. In the *MktRf* column, we report the loading on the market factor. In the *Comove factor* column, we report the loading on the *Comove* factor. In the last row, we aggregate the low-minus-high *IVOL* portfolios across the 23 international markets, using the local total market capitalization as the weight. ***t***-statistics are based on Newey and West (1987) standard errors with 12 lags. The bold typeface indicates statistical significance at the 5% level.

	Double sort		Double sort adjusted with a Comove factor						Triple sort	
Economy	Alpha	*t*	Alpha	*t*	MktRf	*t*	Comove factor	*t*	Alpha	*t*
United States	**0.313**	**3.61**	**0.264**	**3.44**	**–0.174**	**–6.03**	**0.346**	**3.93**	**0.260**	**3.14**
Other G7 markets										
Japan	0.195	1.61	0.212	1.80	**–0.233**	**–5.18**	–0.078	–0.71	**0.299**	**3.01**
UK	**0.456**	**2.51**	**0.424**	**2.42**	–0.148	–0.95	**0.209**	**2.03**	0.279	1.53
France	0.252	1.15	0.222	1.02	–0.089	–0.60	0.116	1.24	0.193	1.03
Germany	**1.148**	**4.93**	**1.091**	**4.59**	–0.037	–0.27	0.078	0.70	**0.924**	**4.84**
Canada	0.449	1.13	0.434	1.17	**–0.356**	**–4.56**	**0.777**	**3.08**	0.396	1.50
Italy	**1.124**	**5.62**	**0.921**	**5.92**	**–0.418**	**–3.32**	**0.268**	**2.99**	**0.937**	**3.83**
Other developed markets										
Hong Kong	0.133	0.39	0.151	0.57	**–0.348**	**–2.73**	**0.793**	**8.53**	–0.088	–0.24
Australia	**0.869**	**2.51**	**1.027**	**3.71**	0.100	0.56	**0.701**	**6.77**	**0.932**	**3.16**
Sweden	**0.617**	**2.22**	0.326	1.19	–0.054	–0.58	**0.576**	**7.11**	**1.108**	**5.07**
Singapore	**0.575**	**2.04**	0.408	1.62	–0.034	–0.22	**0.548**	**7.73**	0.391	1.86
Israel	**1.006**	**3.17**	**0.952**	**3.29**	–0.035	–0.39	0.227	1.87	**1.171**	**4.18**
Non-developed markets										
China	**0.909**	**2.54**	**1.056**	**3.43**	**–0.111**	**–3.09**	0.242	1.61	**1.097**	**3.60**
India	**1.282**	**3.83**	**0.990**	**3.41**	**–0.227**	**–3.34**	**0.618**	**9.06**	**1.270**	**4.71**
South Korea	0.421	1.13	0.372	1.06	**–0.180**	**–2.83**	**0.546**	**4.10**	0.741	1.87
Taiwan	0.232	0.81	0.116	0.40	**–0.410**	**–4.27**	0.289	1.87	0.185	0.76
Indonesia	**0.958**	**2.29**	**0.864**	**2.42**	0.144	1.57	**0.378**	**3.69**	0.027	0.06
South Africa	**1.354**	**3.66**	**1.283**	**3.91**	–0.072	–1.14	0.185	1.53	**0.972**	**3.31**
Malaysia	–0.049	–0.11	–0.499	–1.12	**–0.407**	**–4.70**	**0.736**	**6.33**	0.405	1.50
Thailand	0.380	1.19	0.096	0.35	**–0.186**	**–4.09**	**0.646**	**4.29**	0.244	0.74
Turkey	–0.057	–0.13	–0.110	–0.26	**0.101**	**2.24**	**0.308**	**2.16**	**0.848**	**2.23**
Poland	**1.120**	**2.37**	**1.243**	**2.95**	0.034	0.36	**0.761**	**7.33**	**0.967**	**2.54**
Greece	–0.065	–0.09	0.299	0.59	**–0.218**	**–2.35**	**0.706**	**3.66**	0.012	0.02
Pakistan	–0.550	–1.14	0.333	0.93	**–0.150**	**–2.03**	**0.780**	**4.87**	0.129	0.26
International	**0.482**	**5.92**	**0.461**	**5.96**	**–0.169**	**–3.33**	**0.314**	**4.44**	**0.460**	**5.83**

Table IA7. The characteristics of the *Comove* portfolios – individual economy

This table reports the differences in characteristics (moderate beta, extreme beta, and idiosyncratic volatility) of the high-*Comove* and the low-*Comove* portfolios. The *Comove* portfolios are constructed by controlling for beta, as in Table 2. Panel A reports the characteristics calculated based on the past twelve months' data, contemporaneous to the data used to calculate *Comove*. Panel B reports the characteristics calculated based on the twelve months' data following portfolio formation. To calculate moderate and extreme betas, for each twelve months estimation period, we group the days into two categories by the absolute value of the market return. The extreme market return days are the days with the 20% highest absolute market returns, and the remaining days are the moderate return days. Moderate beta is the beta estimated using the data of the moderate return days, and extreme beta is estimated using data of the extreme return days. In the US, idiosyncratic volatility (*IVOL*) is calculated relative to the Fama-French three-factor model. In the international data, *IVOL* is calculated relative to the local market factor. Reported *IVOL* is annualized by multiplying the standard deviation of daily return residuals by the square root of 252. We winsorize *IVOL* at the 1% and 99% levels by market. In the last row, we aggregate the high-minus-low *Comove* portfolios across the 23 international markets using the local total market capitalization as the weight. *t*-statistics are based on Newey and West (1987) standard errors with 12 lags. The bold typeface indicates statistical significance at the 5% level.

	Panel A. Contemporaneous						Panel B. Future					
Economy	Moderate Beta	*t*	Extreme Beta	*t*	*IVOL*	*t*	Moderate Beta	*t*	Extreme Beta	*t*	*IVOL*	*t*
United States	**0.098**	**8.77**	**0.037**	**8.13**	**–0.120**	**–19.11**	0.017	1.12	0.021	1.80	**–0.112**	**–17.42**
Other G7 markets												
Japan	**0.105**	**11.3**	**0.031**	**5.34**	**–0.103**	**–11.59**	**0.144**	**13.03**	**0.129**	**10.16**	**–0.089**	**–11.10**
UK	**0.070**	**7.47**	**0.028**	**5.57**	**–0.161**	**–15.81**	**0.153**	**10.24**	**0.142**	**7.87**	**–0.144**	**–15.63**
France	**0.098**	**10.69**	**0.053**	**9.64**	**–0.116**	**–13.76**	**0.180**	**15.98**	**0.177**	**17.34**	**–0.108**	**–13.44**
Germany	**0.067**	**4.47**	**0.050**	**8.40**	**–0.231**	**–8.19**	**0.190**	**10.84**	**0.191**	**12.06**	**–0.216**	**–7.91**
Canada	**0.077**	**5.29**	**0.054**	**7.95**	**–0.426**	**–11.95**	**0.149**	**9.34**	**0.168**	**12.36**	**–0.417**	**–12.22**
Italy	**0.102**	**7.57**	**0.067**	**7.65**	**–0.088**	**–17.15**	**0.128**	**6.53**	**0.145**	**7.94**	**–0.074**	**–14.02**
Other developed markets												
Hong Kong	**0.100**	**5.87**	**0.044**	**6.49**	**–0.238**	**–16.73**	**0.183**	**8.59**	**0.148**	**5.60**	**–0.207**	**–17.05**
Australia	**0.070**	**4.60**	**0.012**	**2.76**	**–0.487**	**–15.04**	**0.127**	**4.66**	**0.085**	**6.42**	**–0.466**	**–16.00**
Sweden	**0.101**	**9.82**	**0.016**	**2.35**	**–0.255**	**–9.68**	**0.135**	**6.95**	**0.105**	**6.74**	**–0.238**	**–9.15**
Singapore	**0.048**	**2.19**	**0.029**	**3.33**	**–0.333**	**–13.20**	**0.065**	**2.19**	**0.106**	**4.85**	**–0.314**	**–13.27**
Israel	**0.057**	**3.96**	0.009	1.56	**–0.106**	**–9.16**	**0.089**	**6.55**	**0.077**	**5.71**	**–0.087**	**–7.55**
Non-developed markets												
China	0.009	0.64	**0.030**	**5.90**	**–0.071**	**–10.05**	0.021	1.11	**0.020**	**2.00**	**–0.053**	**–9.26**
India	**0.104**	**11.25**	**0.037**	**6.92**	**–0.164**	**–10.51**	**0.109**	**3.95**	**0.100**	**6.38**	**–0.153**	**–10.03**
South Korea	**0.072**	**8.73**	**0.029**	**8.68**	**–0.140**	**–14.92**	**0.068**	**5.77**	**0.058**	**7.16**	**–0.123**	**–14.27**
Taiwan	**0.055**	**8.24**	**0.043**	**15.03**	**–0.078**	**–9.96**	**0.073**	**6.80**	**0.078**	**8.64**	**–0.069**	**–9.64**
Indonesia	**0.104**	**7.18**	**0.036**	**3.90**	**–0.184**	**–16.48**	**0.189**	**9.10**	**0.195**	**10.68**	**–0.149**	**–14.70**
South Africa	**0.032**	**3.89**	**0.035**	**5.44**	**–0.266**	**–12.69**	0.066	1.75	**0.099**	**7.19**	**–0.256**	**–12.28**
Malaysia	**0.092**	**6.34**	**0.032**	**6.20**	**–0.174**	**–9.35**	**0.103**	**4.46**	**0.079**	**5.17**	**–0.163**	**–8.64**
Thailand	**0.114**	**9.64**	**0.048**	**9.41**	**–0.124**	**–7.88**	**0.159**	**10.42**	**0.142**	**12.61**	**–0.105**	**–7.23**
Turkey	**0.105**	**12.81**	**0.019**	**5.13**	**–0.137**	**–16.34**	**0.121**	**11.29**	**0.080**	**8.71**	**–0.107**	**–14.54**
Poland	**0.074**	**7.53**	**0.023**	**3.58**	**–0.237**	**–9.47**	**0.144**	**6.68**	**0.138**	**10.02**	**–0.218**	**–9.34**
Greece	**0.060**	**2.18**	**0.036**	**4.05**	**–0.140**	**–9.87**	–0.055	–1.94	–0.022	–0.95	**–0.129**	**–8.94**
Pakistan	**0.085**	**5.02**	**0.020**	**2.85**	**–0.255**	**–10.60**	**0.115**	**6.07**	**0.102**	**5.31**	**–0.239**	**–10.81**
International	**0.080**	**26.27**	**0.035**	**24.78**	**–0.200**	**–30.06**	**0.123**	**26.02**	**0.116**	**29.27**	**–0.183**	**–28.16**

Table IA8. The characteristics of the *Comove* portfolios – 10% tail as extreme

This table reports the differences in characteristics (moderate beta, extreme beta, and idiosyncratic volatility) of the high-*Comove* and the low-*Comove* portfolios. The *Comove* portfolios are constructed by controlling for beta, as in Table 2. Panel A reports the characteristics calculated based on the past twelve months' data, contemporaneous to the data used to calculate *Comove*. Panel B reports the characteristics calculated based on the twelve months' data following portfolio formation. To calculate moderate and extreme betas, for each twelve months estimation period, we group the days into two categories by the absolute value of the market return. The extreme market return days are the days with the 10% highest absolute market returns, and the remaining days are the moderate return days. Moderate beta is the beta estimated using the data of the moderate return days, and extreme beta is estimated using data of the extreme return days. In the US, idiosyncratic volatility (*IVOL*) is calculated relative to the Fama-French three-factor model. In the international data, *IVOL* is calculated relative to the local market factor. Reported *IVOL* is annualized by multiplying the standard deviation of daily return residuals by the square root of 252. We winsorize *IVOL* at the 1% and 99% levels by market. *t*-statistics are based on Newey and West (1987) standard errors with 12 lags. The bold typeface indicates statistical significance at the 5% level.

	Panel A. Contemporaneous						Panel B. Future					
	Moderate		Extreme				Moderate		Extreme			
Economy	Beta	*t*	Beta	*t*	*IVOL*	*t*	Beta	*t*	Beta	*t*	*IVOL*	*t*
United States	**0.090**	**9.73**	**0.017**	**3.00**	**–0.120**	**–19.11**	0.018	1.29	0.021	1.83	**–0.112**	**–17.42**
Other G7 markets												
Japan	**0.103**	**12.12**	0.009	1.16	**–0.103**	**–11.59**	**0.160**	**11.59**	**0.118**	**8.61**	**–0.089**	**–11.10**
UK	**0.074**	**9.57**	**0.013**	**2.05**	**–0.161**	**–15.81**	**0.160**	**10.46**	**0.132**	**7.25**	**–0.144**	**–15.63**
France	**0.087**	**11.04**	**0.048**	**7.78**	**–0.116**	**–13.76**	**0.175**	**19.87**	**0.171**	**16.28**	**–0.108**	**–13.44**
Germany	**0.073**	**6.55**	**0.036**	**4.47**	**–0.231**	**–8.19**	**0.198**	**12.30**	**0.181**	**11.83**	**–0.216**	**–7.91**
Canada	**0.084**	**7.60**	**0.047**	**4.96**	**–0.426**	**–11.95**	**0.160**	**11.91**	**0.166**	**11.05**	**–0.417**	**–12.22**
Italy	**0.092**	**7.42**	**0.066**	**7.87**	**–0.088**	**–17.15**	**0.131**	**7.53**	**0.151**	**8.10**	**–0.074**	**–14.02**
Other developed markets												
Hong Kong	**0.108**	**7.58**	0.016	1.51	**–0.238**	**–16.73**	**0.173**	**8.29**	**0.136**	**4.61**	**–0.207**	**–17.05**
Australia	**0.074**	**5.94**	–0.007	–0.98	**–0.487**	**–15.04**	**0.145**	**3.57**	**0.065**	**4.26**	**–0.466**	**–16.00**
Sweden	**0.080**	**10.93**	0.005	0.50	**–0.255**	**–9.68**	**0.133**	**7.62**	**0.097**	**6.49**	**–0.238**	**–9.15**
Singapore	**0.061**	**4.06**	0.015	1.40	**–0.333**	**–13.20**	**0.087**	**3.21**	**0.086**	**4.00**	**–0.314**	**–13.27**
Israel	**0.049**	**4.67**	0.001	0.18	**–0.106**	**–9.16**	**0.093**	**6.30**	**0.058**	**4.49**	**–0.087**	**–7.55**
Non-developed markets												
China	0.010	1.24	**0.036**	**5.49**	**–0.071**	**–10.05**	0.015	1.31	0.019	1.94	**–0.053**	**–9.26**
India	**0.097**	**11.87**	**0.026**	**3.90**	**–0.164**	**–10.51**	**0.111**	**4.89**	**0.095**	**5.51**	**–0.153**	**–10.03**
South Korea	**0.069**	**12.99**	**0.017**	**3.38**	**–0.140**	**–14.92**	**0.071**	**6.72**	**0.053**	**7.00**	**–0.123**	**–14.27**
Taiwan	**0.057**	**10.15**	**0.037**	**9.20**	**–0.078**	**–9.96**	**0.081**	**8.45**	**0.070**	**7.03**	**–0.069**	**–9.64**
Indonesia	**0.084**	**8.22**	0.020	1.51	**–0.184**	**–16.48**	**0.192**	**14.07**	**0.172**	**8.25**	**–0.149**	**–14.70**
South Africa	**0.042**	**5.51**	**0.025**	**3.74**	**–0.266**	**–12.69**	**0.083**	**3.14**	**0.097**	**6.88**	**–0.256**	**–12.28**
Malaysia	**0.088**	**7.62**	**0.019**	**2.68**	**–0.174**	**–9.35**	0.053	1.41	**0.075**	**4.41**	**–0.163**	**–8.64**
Thailand	**0.107**	**11.66**	**0.033**	**5.16**	**–0.124**	**–7.88**	**0.158**	**11.67**	**0.133**	**11.39**	**–0.105**	**–7.23**
Turkey	**0.096**	**11.96**	–0.001	–0.14	**–0.137**	**–16.34**	**0.115**	**12.06**	**0.072**	**7.79**	**–0.107**	**–14.54**
Poland	**0.068**	**7.56**	**0.016**	**2.01**	**–0.237**	**–9.47**	**0.147**	**7.70**	**0.130**	**9.41**	**–0.218**	**–9.34**
Greece	**0.061**	**3.89**	0.019	1.74	**–0.140**	**–9.87**	–0.046	–1.72	–0.027	–1.15	**–0.129**	**–8.94**
Pakistan	**0.096**	**7.30**	–0.007	–0.83	**–0.255**	**–10.60**	**0.139**	**11.58**	**0.070**	**2.79**	**–0.239**	**–10.81**
International	**0.079**	**32.76**	**0.022**	**11.95**	**–0.200**	**–30.06**	**0.126**	**25.96**	**0.107**	**25.90**	**–0.183**	**–28.16**

Table IA9. Adjusting with an *IVOL* factor – CAPM augmented with an *IVOL* factor

Description: This table reports the alphas of the high-minus-low *Comove* long-short portfolio. The portfolios are equal-weighted. The *Comove* portfolios are constructed by controlling for beta, as in Table 2. We report the alphas from a model with the local market factor plus the *IVOL* factor. The *IVOL* factor is constructed based on a double sort: first by beta and then by *IVOL*, and is equal-weighted. In the last row, we aggregate the high-minus-low *Comove* portfolios across the 23 international markets, using the local total market capitalization as the weight. *t*-statistics are based on Newey and West (1987) standard errors with 12 lags. The bold typeface indicates statistical significance at the 5% level.

Interpretation: The high-minus-low *Comove* long-short portfolio has an alpha that is indistinguishable from zero once the *IVOL* factor is adjusted.

Economy	Alpha	*t*	MktRf	*t*	*IVOL* factor	*t*
United States	0.044	0.63	**0.133**	**7.33**	**0.493**	**13.42**
Japan	0.083	0.99	**0.147**	**6.22**	**0.386**	**5.14**
UK	0.053	0.57	**0.181**	**7.22**	**0.48**	**15.05**
France	0.199	1.50	**0.181**	**8.65**	**0.185**	**2.99**
Germany	0.173	1.15	**0.237**	**8.04**	**0.199**	**3.67**
Canada	–0.263	–1.57	**0.168**	**6.21**	**0.526**	**11.19**
Italy	0.169	0.90	**0.094**	**4.88**	**0.208**	**6.14**
Hong Kong	–0.291	–1.76	**0.256**	**8.40**	**0.749**	**9.31**
Australia	**–0.798**	**–6.68**	**0.091**	**4.81**	**0.581**	**14.94**
Sweden	0.033	0.15	**0.140**	**5.85**	**0.506**	**8.66**
Singapore	–0.162	–1.20	**0.167**	**6.20**	**0.591**	**8.40**
Israel	**–0.378**	**–2.08**	0.026	1.00	**0.295**	**5.52**
China	**–0.362**	**–2.20**	0.021	0.86	**0.453**	**5.81**
India	–0.048	–0.31	**0.084**	**4.59**	**0.498**	**9.81**
South Korea	–0.108	–0.53	**0.075**	**3.80**	**0.421**	**10.15**
Taiwan	**0.308**	**2.56**	0.040	1.43	**0.151**	**2.19**
Indonesia	–0.152	–0.50	**0.155**	**3.28**	**0.319**	**4.90**
South Africa	–0.201	–1.26	**0.115**	**5.95**	**0.428**	**10.25**
Malaysia	–0.066	–0.65	**0.151**	**12.17**	**0.422**	**11.11**
Thailand	0.084	0.61	**0.213**	**10.23**	**0.308**	**3.83**
Turkey	–0.164	–0.78	**0.034**	**2.29**	**0.488**	**6.70**
Poland	**–0.555**	**–2.64**	0.053	1.75	**0.423**	**10.67**
Greece	–0.148	–0.82	**0.079**	**3.58**	**0.489**	**8.62**
Pakistan	–0.428	–1.75	**0.120**	**4.26**	**0.432**	**10.83**
International	–0.032	–0.57	**0.126**	**5.45**	**0.379**	**11.09**