Is Idiosyncratic Volatility Priced in Commodity Futures Markets?

Adrian Fernandez-Perez
Auckland University of Technology, New Zealand

Ana-Maria Fuertes
Cass Business School, City, University of London, U.K.

Joëlle Miffre
EDHEC Business School, Nice, France

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This article investigates the nexus between idiosyncratic volatility and returns in commodity futures markets. The findings indicate that the abnormal performance of active strategies, which systematically exploit idiosyncratic volatility, is a fallacy associated with the use of an inappropriate benchmark. Suitable benchmarks that are related to a commodity's curve shape (i.e., whether the market is in backwardation or contango) reveal instead the reality of idiosyncratic volatility not being priced because it can be diversified away.

Introduction

A financial asset's idiosyncratic volatility is typically measured as the residual standard deviation of an appropriate empirical model that captures the relationship between systematic risk and expected return. A challenging question still subject to debate in the context of commodities is: which are the most appropriate risk factors? This paper measures idiosyncratic volatility relative to two families of pricing models as benchmarks. Inspired by the traditional asset pricing literature, the first family of models includes as risk factors the S&P-GSCI, U.S. value-weighted equity index, equity size (known as small-minus-large, SMB), equity value (or high-minus-low, HML), equity momentum (or up-minus-down, UMD), and the Barclays bond index.

The second family of commodity pricing models employed in this paper stems from the theories of storage (Kaldor, 1939; Fama and French, 1987) and hedging pressure (Cootner, 1960). The risk factors that emanate from these theories are designed to capture the fundamentals relating to a commodity futures contract's curve shape.

The main finding of the paper is that traditional benchmarks lead to a spurious negative relationship between past idiosyncratic volatility of commodity futures contracts and subsequent excess returns. The paper shows that when the benchmarks are based on long-short commodity risk factors that exploit term structure, hedging pressure or momentum signals (and thus, capture the fundamentals of

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This digest article was written by Ana-Maria Fuertes, Ph.D., Professor in Finance and Econometrics at Cass Business School, City, University of London (U.K.).

backwardation and contango), there is no significant relationship between past idiosyncratic volatility and subsequent returns in commodity futures markets.

Why the Paper's Research Question is Important

The paper provides findings that are relevant for commodity pricing theory in highlighting the relevance of benchmarks that employ risk factors that are related to a commodity's futures curve shape. The article also provides lessons for market practitioners as it uncovers the fallacy of abnormal profitability of idiosyncratic volatility trading in commodity futures markets.

Commodity Futures' Risk Factors

The paper's commodity risk factors are constructed as long-short portfolios according to term structure (TS), hedging pressure (HP) and momentum (Mom) signals from a wide cross-section of 27 commodity futures. The TS portfolio buys the 20% of contracts with the most downward-sloping term structures and shorts the 20% of contracts with the most upward-sloping term structures. The HP portfolio buys the 20% of contracts for which hedgers are the shortest and speculators the longest and sells the 20% of contracts for which hedgers are the longest and speculators the shortest. The Mom portfolio buys the 20% of contracts with the best past performance and sells the 20% of contracts with the worst past performance. These end-of-month rebalanced portfolios are based on 12-month (ranking period) averaged signals. The holding period is 1 month. The quintile constituents are equally-weighted. The portfolios are fully collateralized.

The data employed in the analysis are sampled at the daily frequency and cover the period from January 1989 to December 2013. Summing up the performance of the risk factors over the sample period, the paper observes that the Sharpe ratio of the long-short commodity portfolios averages 0.46, whereas that of the long-only S&P-GSCI is just 0.02. This confirms the wisdom that investors benefit from taking long positions in backwardated markets and short positions in contangoed markets.

Does Idiosyncratic Volatility Explain the Cross-Section of Commodity Returns?

At the end of each month during the sample period, the paper measures the idiosyncratic volatility of each commodity as the residual standard deviation of a daily time-series regression model of the commodity excess returns on the relevant set of risk premia factors, according to the benchmark (pricing model) at hand. For each commodity and per sample month t, this procedure results in the calculation of the betas or factor loadings, $\beta(t)$, and an idiosyncratic volatility measure, $IVol(t\text{-}R,t)$, where R={1, 3, 6, 12} denotes the length of the ranking period or time-series regression estimation window in months. Next a cross-section regression is estimated per sample month t to explain the variation in excess returns of the 27 commodities using as regressors the contemporaneous risk factor loadings, $\beta(t)$, and the prior R-month IVol measure.

The results of using one *versus* another type of benchmark provide a stark contrast:

a) In the context of traditional benchmarks, IVol is priced cross-sectionally and commands a significantly negative risk premium.

b) In the context of curve-shape-related benchmarks, IVol is not priced.

The contrasting findings indicate that idiosyncratic volatility proxies for a "missing" risk factor in traditional benchmarks that relate to backwardation and contango.

Idiosyncratic Volatility Trading is Not Worthwhile

The paper examines the performance of a long-short idiosyncratic volatility strategy which buys the quintile of commodities with the lowest IVol(t-R,t) over the past R (=1, 3, 6 or 12) months, sells the quintile with the highest IVol(t-R,t) and holds the positions for a month. These long-short portfolios are fully collateralized, rebalanced at the end of each month, and the quintile constituents are equally weighted.

From the lens of traditional benchmarking, the idiosyncratic volatility strategy attains a Sharpe ratio of 0.41 and earns an alpha of about 3.89% a year. In the context of more realistic benchmarks, however, the Sharpe ratio and alpha of the idiosyncratic volatility portfolios drop substantially to 0.12 and 0.86%, respectively, suggesting that the strategy is not worthwhile (if one is already engaging in the three benchmark long-short strategies.) These findings reaffirm the tenet that idiosyncratic volatility is not priced because it can be diversified away.

Conclusions

This paper investigates the relation between idiosyncratic volatility and expected returns in commodity futures markets using traditional and curve-shape-related benchmarks. The paper shows that using traditional benchmarks leads to the spurious finding that the idiosyncratic volatility signal is negatively priced in the cross-section, and the resulting long-short portfolios are profitable as suggested by an annualized mean excess return, Sharpe ratio and *alpha* of 3.98%, 0.41 and 3.89% on average, respectively. When the benchmarks are based on long-short commodity risk factors that exploit term structure, hedging pressure or momentum signals (and thus, capture the fundamentals of backwardation and contango), the idiosyncratic volatility signal is not priced and the mean excess return, Sharpe ratio and *alpha* of the *IVol* portfolio shrink to 1.18%, 0.12 and 0.86% a year on average, respectively.

The main contribution of the paper is to demonstrate the "fallacy" of the pricing of idiosyncratic volatility in commodity futures markets. The profits made by selling commodities with high idiosyncratic volatility and buying commodities with low idiosyncratic volatility is an artifact of two methodological problems pertaining to the choice of asset pricing model. One is that the idiosyncratic volatility signal derived from traditional benchmarks is not idiosyncratic because it contains a systematic risk component related to the backwardation and contango fundamentals. Another is that the *alpha* is measured using an improper benchmark for the same reason. This digest article's research paper provides additional evidence to reaffirm that risks that relate to the backwardation and contango dynamics of commodity futures markets ought to be factored in an appropriate pricing model.

Endnote

The author of this digest article is also a member of the Editorial Advisory Board (EAB) of the *Global Commodities Applied Research Digest (GCARD).* The *GCARD*'s EAB membership is listed here: http://jpmcc-gcard.com/editorial-advisory-board/.

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Keywords

Commodity futures, idiosyncratic volatility, backwardation, contango.