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The return impact of realized and expected idiosyncratic volatility

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ABSTRACT

We show that the negative relation between realized idiosyncratic volatility, measured over the prior month, and returns is robust in non-January months. Controlling for realized idiosyncratic volatility, we show that the relation between returns and expected idiosyncratic volatility is positive and robust. Realized and expected idiosyncratic volatility are separate and important effects describing the cross-section of returns. We find the negative return on a zero-investment portfolio that is long high realized idiosyncratic volatility stocks and short low realized idiosyncratic volatility stocks is dependent on aggregate investor sentiment. In cross-sectional tests, we find the negative relation is weaker for stocks with a large analyst following and stronger for stocks with high dispersion of analyst forecasts. The positive relation between expected idiosyncratic volatility and returns is not due to mispricing.

1. Introduction

Ang et al. (2006) (hereafter AHXZ) and Ang et al. (2009) document an interesting "puzzle" in the pricing of idiosyncratic risk. They sort stocks into value-weighted portfolios based on the previous month's realized idiosyncratic volatility and find a zero-investment portfolio that is long the most volatile portfolio and short the least volatile portfolio yields about −1% the following month. This return is statistically and economically significant. AHXZ interpret this as a negative risk-return relation, which is counter to classical financial economics. Huang et al. (2010) (hereafter HLRZ) demonstrate this is not a "puzzle" at all, but rather is the result of biased weighting of portfolios and biased estimates in cross-sectional regressions induced by return reversals, the short-term negative serial correlation in monthly stock returns. HLRZ demonstrate that after controlling for return reversals the significant negative relation between returns and prior realized idiosyncratic volatility disappears.

We demonstrate that the negative relation found by AHXZ cannot yet be dismissed. Jegadeesh (1990) and Lehmann (1990) find January seasonality in the 1-months serial correlation of stock returns. We show that the relation between realized idiosyncratic volatility and returns depends on January seasonality. This means the biases demonstrated in HLRZ are much smaller in non-January months. We find the negative relation between returns and AHXZ's lagged realized idiosyncratic volatility is robust to the return reversal in non-January months. We also show that expected idiosyncratic volatility, based on longer-term and lower-frequency data, maintains the characteristic positive risk-return relation of idiosyncratic risk in January and non-January months.[1] We further show that neither idiosyncratic volatility measure subsumes the other. We link the negative relation between realized idiosyncratic volatility and returns to mispricing, while the relation between expected idiosyncratic volatility and returns, previously linked in the literature to idiosyncratic risk and diversification, is not a function of sentiment and exists in the subset of stocks with high analyst coverage.

The contributions of HLRZ give cause to dismiss the negative relation found in AHXZ. HLRZ argue that value-weighted zero-investment portfolios give disproportionate weight to recent winners. Due to return reversals, these portfolios will have negative expected returns. Furthermore, as shown by HLRZ, a portfolio of high volatility stocks has lower expected returns than a portfolio of low volatility stocks. They theorize that this is what the value-weighted portfolios in AHXZ are capturing, not a negative risk premium. Equally weighting stocks should mitigate the negative expected returns of zero-investment portfolios. HLRZ, like Bali

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[1] An incomplete list of models that predict a positive relation include Merton (1987), Jones and Rhodes-Kropf (2002), and Malkiel and Xu (2006).

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and Cakici (2008), show that this methodological change drives the profit of the zero-investment portfolio to zero. This is consistent with return reversals causing the results.

HLRZ also show that the negative coefficients from cross-sectional regressions of returns on realized volatility found in Ang et al. (2009), which are akin to an equal-weighting methodology, are the result of bias in estimation. Realized idiosyncratic volatility is positively correlated with contemporaneous returns and monthly returns are negatively serially correlated due to return reversals. Therefore, without properly accounting for return reversals, the estimated coefficient on lagged realized idiosyncratic volatility has downward bias. By including the previous month's return, the negative estimate on lagged realized idiosyncratic volatility is attenuated and close to zero. Similarly, when HLRZ include a factor that is intended to capture return reversals, the abnormal returns on a zero-investment portfolio that is long stocks with high lagged realized idiosyncratic volatility and short stocks with low lagged realized idiosyncratic volatility is close to zero.

The relation between returns and idiosyncratic risk is also studied with measures of expected idiosyncratic volatility rather than the realized measure of AHXZ. Jiang and Lee (2006) show that lagged realized idiosyncratic volatility is a poor forecast of future idiosyncratic volatility and, therefore, is a poor proxy for idiosyncratic risk. Using several lags of idiosyncratic volatility, they construct a proxy for conditional expected idiosyncratic volatility that captures the known time-series properties of volatility and find a significantly positive relation between idiosyncratic volatility and returns. Similarly, Chua et al. (2010) assume an autoregressive structure of idiosyncratic volatility and decompose it into expected and unexpected components. They find that expected returns are positively related to expected idiosyncratic volatility. Fu (2009) uses a best-fit EGARCH model of nine specifications to generate a forecast of conditional expected idiosyncratic volatility. He finds that this forecast is significantly positively related to returns. Spiegel and Wang (2005) use an EGARCH(1,1) model and find a similar positive relation. In an international sample, Bali and Cakici (2010) find a positive relation in cross-sectional regressions of country-level market returns on country-level aggregate idiosyncratic volatility.

Given the January seasonality in monthly return reversals found by Jegadeesh (1990) and Lehmann (1990), we investigate the seasonality in the pricing of idiosyncratic volatility. We find that lagged realized idiosyncratic volatility has a significantly positive relation to returns in January, but a significantly negative relation in non-January months. By aggregating these two opposing effects, previous literature finds a weak anomaly that is sensitive to specification. Furthermore, we show that expected idiosyncratic volatility, measured as in Fu (2009), has a constant positive relation to returns that is robust in January and non-January months.

Next, we address the conflicting stories told by the AHXZ measure of lagged realized idiosyncratic volatility and the expected idiosyncratic volatility measure, used in Fu (2009). The two measures are highly correlated. We show that, controlling for expected idiosyncratic volatility, there is still a significant negative relation between lagged realized idiosyncratic volatility and returns in non-January months. There is also a positive relation between returns and expected idiosyncratic volatility. We find that neither expected nor realized idiosyncratic volatility subsumes the importance of the other. This motivates our study to differentiate the sources of these effects as they are clearly separately important for pricing stocks.

The literature provides support for a positive tradeoff between idiosyncratic risk and returns. Merton (1987) constructs a simple model where investors cannot perfectly diversify. Since they are required to bear some idiosyncratic risk, investors demand compensation in the form of higher returns. In an international sample, Brockman et al. (2009) find support for the Fu (2009) measure capturing the risk premium for undiversified idiosyncratic risk. Brockman, et al. show that the positive relation between expected idiosyncratic volatility and returns exists in most countries in their sample and the magnitude of the positive relation is higher in countries with greater investor underdiversification. Therefore, the expected idiosyncratic volatility measure from Fu seems to be capturing the idiosyncratic risk-return tradeoff.

Prior studies provide less support for a negative relation between idiosyncratic risk and returns. AHXZ theorize that lagged realized idiosyncratic volatility may be a proxy for sensitivity to aggregate market volatility, which they show has a negative price. They are unable to empirically support this hypothesis, though. Guo and Savickas (2010) argue that lagged realized idiosyncratic volatility is a proxy for sensitivity to a systematic hedging risk factor. Rubin and Smith (2011) look at several different theoretical motivations for the rise in idiosyncratic volatility and do not find a single theory that explains both the time-series and cross-sectional patterns in the data. Therefore, we are motivated to explore possible alternative explanations for the importance of lagged realized idiosyncratic volatility in stock returns beside the representation of idiosyncratic risk.

Some studies predict a negative relation between idiosyncratic volatility and returns in the framework of mispricing. Shleifer and Vishny (1997) construct a model where arbitrageurs are risk averse and hold underdiversified portfolios for greater exposure to mispricing. As such, they demand higher returns to correct the mispricing of stocks with large amounts of idiosyncratic risk. Shleifer and Vishny stress that correcting mispricing due to investor sentiment is very risky. Therefore, they require stock prices to deviate further from fundamentals in the direction of the mispricing before correcting the mispricing and earning greater returns. These greater returns should be increasing in investor sentiment.

Brav et al. (2010) empirically investigate the relation between limits of arbitrage, particularly idiosyncratic risk, and stock return anomalies. They find that idiosyncratic volatility is associated with overvaluation anomalies, such as portfolios of small growth stocks and 6-months loser stocks, but not undervaluation anomalies, such as value stocks and 6-months winner stocks. Venezia et al. (2011) show that investor herding Granger causes idiosyncratic volatility in stocks. We build on these findings to investigate the source of the robust negative average return of the AHXZ zero-investment portfolio.

In the framework of Shleifer and Vishny (1997), the construction of our realized idiosyncratic volatility measure captures the mispricing in month $t-1$. Our study of returns in month t analyzes the mispricing correction. Since this mispricing is typically overvaluation, we expect a low return in month t for high idiosyncratic volatility stocks relative to accurately priced stocks. If stocks with low realized idiosyncratic volatility are fairly priced, a portfolio that is long high realized idiosyncratic volatility stocks and short low realized idiosyncratic volatility stocks will have, on average, negative returns. These returns should be more pronounced when aggregate sentiment is high.

We construct portfolios to capture the premium on the two idiosyncratic volatility effects over non-January months. For each idiosyncratic volatility measure, our portfolio neutralizes the effect of the other. We use the sentiment index from Baker and Wurgler (2006, 2007) to examine the relation between sentiment and returns on the zero-investment portfolios. We find that returns on the realized idiosyncratic volatility portfolio are significantly negatively related to sentiment levels during the month we measure idiosyncratic volatility, consistent with mispricing rather than risk driving the AHXZ results. We do not find a significant relation between returns on the expected idiosyncratic volatility portfolios and sentiment, consistent with these returns capturing the