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The idiosyncratic volatility anomaly: Corporate investment or investor mispricing?

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ABSTRACT

Most of the literature on the idiosyncratic volatility anomaly has focused on plausible explanations for it based on investor preferences, investor irrationality or market characteristics. Surprisingly, the role of asset-pricing models and firm characteristics in the estimation of idiosyncratic risk measures has been largely neglected. Our results suggest that investment and profitability, presumably driven by managers and therefore linked to idiosyncratic risk, are able to account for the anomaly in a cross-section of stock returns. Moreover, we show that this effect is independent and complementary to the effects related to investor preference for skewness.

1. Introduction

The finding that portfolios with the highest idiosyncratic risk levels yield significantly lower returns than do those with the lowest levels came as a puzzling surprise in the asset-pricing literature (Ang et al., 2006, 2009). At first sight, this empirical fact controverted the concept of diversification, supposed to be a force sufficiently strong to eliminate any predictive power of idiosyncratic risk over expected returns. However, contradicting the anomaly, under-diversification models such as that described by Merton (1987) anticipate a positive relationship between idiosyncratic risk and expected returns. Therefore, it appears that there is more to the anomaly than a simple lack of diversification. Although this observation was initially contested in papers such as Bali and Caciki (2008) and Fu (2009), several studies on the idiosyncratic volatility anomaly written since the seminal work of Ang et al. (2006) revealed that the information content of idiosyncratic risk has become a relevant issue in asset pricing.

This is not surprising, because understanding the nature of the relationship between risk and return is a core necessity in the field of finance; that relationship has significant effects on both researchers and practitioners. In the case of the idiosyncratic risk, the discussion has been divided into the two strands of literature that we discuss below. The first strand is formed by papers that dispute the construction of the underlying risk measure. These papers are dedicated to showing that the estimation of the idiosyncratic risk varies largely with the methodologies and data used for the analysis and conclude that the puzzling empirical observation is not robust. In addition to those discussed at the beginning of this paper, relevant examples include Huang et al. (2010), who link the anomaly to microstructure issues such as return reversals or trading non-synchronicity. Moreover, Han and Lesmond (2011) and Malagon et al. (2015) suggest that the relationship between risk and return seems to become positive as the investor's time horizon increases.

The second strand comprises papers that assume the construction of the measures involved in the controversial empirical observation is sound. Therefore, the papers focus on explaining that the negative relationship between idiosyncratic volatility and returns is driven by familiar factors, for instance investor preferences or market microstructure, that justify observing lower returns for the stocks with higher idiosyncratic risk. In this strand,

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Kapadia (2006) argues that idiosyncratic risk and cross-sectional skewness are highly correlated, thus linking the anomaly to investors' preference for skewness. In a similar vein, Boyer et al. (2010) conclude that the anomaly can be explained by investors' preference for high idiosyncratic skewness. Yet another explanation related to preferences is provided by Bali et al. (2011) based on the idea that investors tilt towards stocks with lottery-like payouts. Their paper shows that a sort based on this characteristic accounts for the negative relationship between returns and idiosyncratic risk. In contrast with these explanations based on investors' rationality, Gao et al. (2012) provide evidence showing that the relationship between idiosyncratic volatility and expected returns depends on investor sentiment.

Given the recent nature of the anomaly, the debate is active and still developing in both strands as demonstrated by papers such as Jiang et al. (2009), who refute the hypothesis that investors' irrationality explains the idiosyncratic volatility anomaly, and Chen et al. (2012), who refute the market microstructure arguments.[1] Independently of the challenges each approach has recently faced, the underlying theoretic ideas behind both strands can co-exist. In other words, investors' preference for skewness and lottery-like payout stocks does not necessarily rule out that the idiosyncratic risk measure might be poorly estimated, and vice versa.

Surprisingly, the literature arguing the puzzle is not robust has ignored the possibility that the asset-pricing model used to estimate the idiosyncratic risk might provide a poor approximation to the concept of firm-specific risk. Indeed, idiosyncratic risk is always estimated as a residual from a particular asset-pricing model such that, if the model is inaccurate, the measure of idiosyncratic risk could be capturing more information than it should. Moreover, the asset-pricing literature is a prolific source of models that have strong theoretical grounds and that have been proven to outperform the Fama and French three-factor model in explaining the cross-section of stock returns. Examples include models based on risk factors such as momentum (Carhart, 1997), co-skewness (Harvey and Siddique, 2000), liquidity (Pástor and Stambaugh, 2003), and more recently profitability and investment (Fama and French, 2014). Therefore, leaving aside the possibility of an inaccurate asset-pricing model in favour of more-complex rationales, the literature has neglected what a major field in research on asset pricing has to say about the relationship between idiosyncratic risk and expected returns.[2] In this context, asset-pricing models based on firm characteristics are of special relevance because idiosyncratic risk should be linked to managerial decisions that, in turn, are related to firm characteristics.

In this paper, we advance the hypothesis that the idiosyncratic risk measure typically used when discussing the risk-return relationship captures information about a firm's profitability and investment that is relevant in explaining the expected returns. These two characteristics depend on managerial decision making and could intuitively be linked to idiosyncratic risk. Our approach is based on Valuation Theory, which states that a given level of profitability, investment and expected returns are negatively related under both rational and irrational investor expectations. If our hypothesis is true, this theory implies that the idiosyncratic volatility anomaly should disappear after joint controls for profitability and investment are considered. The main contribution of this paper is that we offer a plausible and innovative explanation for the observation of the anomaly that is totally independent from investors and solely related to corporate decisions and, therefore, to firms' characteristics. In a recent paper, Hou et al. (2015) show an empirical *q*-factor model using investment and profitability factors to account for the idiosyncratic volatility anomaly. However, because we base our analysis on characteristics, we can go further. In particular, we study how the components of investment and profitability affect the idiosyncratic volatility. The results discussed in this paper suggest that the negative relationship between idiosyncratic risk and expected returns might be related to the management of inventories. We believe that showing that firms' characteristics might be powerful in explaining the cross-section of stock returns, and that these particular interactions and their consequences for the asset-pricing field could be overlooked when only considering pricing factors, is a relevant contribution. Additionally, to the best of our knowledge, no other papers treating the effects of inventories, turnover and other components of profitability and investment are available to date. A less relevant contribution is that because our hypothesis can be tested under periods of both investors' rationality and irrationality, our results allow us to reconcile the apparently contradictory findings of Jiang et al. (2009) and of Gao et al. (2012) mentioned above.

Our results strongly support our hypothesis; in the cross-section, profitability and investment are able to account for the idiosyncratic risk anomaly when they are considered together. Moreover, this result prevails both in times characterized by high investor sentiment and times characterized by low investor sentiment. In this sense, our results appear to indicate that the idiosyncratic volatility anomaly might not be related to investors' preferences or expectations but to managerial decision making, which affects both investment and firm profitability. Moreover, we show promising results when explicitly considering profitability and investment as risk factors in the estimation of the idiosyncratic risk through the Fama and French 5-factors model (2014) given that, in this case, the anomaly is halved in alphas.

The remainder of the paper is organized as follows. Section 2 discusses the methodologies and the data we consider together with some preliminary evidence to motivate our approach. In turn, Section 3 describes our empirical findings based on cross-sectional regressions including controls related to corporate variables and on portfolio sorting once idiosyncratic risk is estimated through the Fama and French (2014) five-factor model. The section also includes a discussion of the relationship between our corporate variables and skewness, a variable that has been shown to account for the negative link between idiosyncratic risk and expected returns. Section 4 concludes the paper.

2. Methodology, data and preliminary evidence

2.1. Methodology

As previously stated, our discussion is framed in the context of asset-pricing models and the fact that the empirical patterns between investment, profitability and returns that have been identified in the past might influence the robustness of the idiosyncratic volatility anomaly. These patterns can be linked to Valuation Theory, which states that investment, profitability and returns are linked such that to study the relationship between any two of these variables, it is necessary to control for the third one. These links are demonstrated by Fama and French (2006) who, using the dividend discount model and clean surplus accounting, define equity market value as follows:

$$M_t = \sum_{\tau=1}^{\infty} E(Y_{t+\tau} - dB_{t+\tau})/(1+r)^{\tau}, \quad (1)$$

[1] An interesting related issue is why the anomaly is not arbitraged away. This issue is addressed in papers such as Boehme et al. (2009), Au et al. (2009), Cao and Han (2010) and Duan et al. (2010) that argue that idiosyncratic risk determines arbitrage cost, making the anomaly costly to arbitrage.

[2] A notable exception to this trend is a recent paper by Hou et al. (2015), who account for several anomalies, including the idiosyncratic risk one, based on an empirical *q*-factor model. We explain later in this paper how our results diverge from theirs.