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Determinants of idiosyncratic volatility: Evidence from the Indian stock market

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ABSTRACT

This paper investigates whether firm-specific characteristics explain idiosyncratic volatility in the stocks of non-financial firms traded in the Indian stock market. It employs the linear time series five-factor model, augmented with a liquidity factor and the conditional EGARCH model, to extract yearly idiosyncratic volatility. We estimate a panel data regression to quantify the relationship between firm-specific characteristics and the volatility of individual securities. The results show that idiosyncratic volatility is significant in emerging markets such as India, and that cross-sectional return variations of firms are associated with firm-specific characteristics such as firm size, book-to-market ratio, momentum, liquidity, cash flow-to-price ratio, and returns on assets. We find that the idiosyncratic risk documented in this study is associated with smaller size of company, higher liquidity, low momentum, high book-to-market ratio, and low cash flow-to-price ratio. The findings suggest need to develop alternative tools to make investment decisions in emerging markets.

1. Introduction

The conventional portfolio theory of finance holds that rational investors in perfect capital markets diversify unsystematic risk completely by holding uncorrelated assets in their portfolio (Markowitz, 1952), and early theoretical models hypothesize that systematic market risk is the sole determinant of expected stock returns (*e.g.*, Sharpe, 1964; Lintner, 1965; Black, 1976). The extant literature documents anomalies in modern finance such as firm size; book-to-market ratio (BM); price-earnings (P/E) ratio; firm leverage; momentum returns (MM); cash flow-to-price ratio (CF/P); and profitability ratios such as returns on equity (ROE) and returns on assets (ROA), sales growth, assets growth, dividend yield, *etc.* The pertinent literature on asset pricing shows that the capital asset pricing model (CAPM) does not capture the role of these firm-specific factors; therefore, alternative asset pricing models are proposed to explain the expected returns of the stocks. Some studies analyze the role of the idiosyncratic volatility (Ivol) of stock returns in the determination of expected stock returns across countries by following the approach of an imperfect capital market and under-diversification. Merton (1987) and Malkiel and Xu (2002) argue that poorly diversified portfolios require an extra risk premium for holding stocks with high Ivol and thus suggesting a strong relationship between idiosyncratic risk and expected stock returns. Campbell et al. (2001) document the increasing idiosyncratic risk in the stock market over the past four decades.

In this light, further investigation of Ivol is needed. No study examines the factors that influence Ivol in emerging markets (EMs) such as India. This study aims to estimate idiosyncratic risk in the Indian stock market and identify its determinants by employing a liquidity-augmented five-factor model in under-diversification conditions at equilibrium. By bridging the gap in the literature on EMs, we contribute to the literature on Ivol in the following ways.

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First, while a few studies in developed financial markets show evidence of pricing of idiosyncratic risk and receipt of risk premium by investors (Ang et al., 2006, 2009; Fu, 2009), these findings do not apply to EMs, which have peculiar characteristics and are heterogeneous. Research into volatility in stock markets in EMs has assumed significance over the years because of economic liberalization, faster economic growth, increase in stock market size, and international portfolio flows. In this context, India is an ideal candidate to examine research issues on Ivol that have not yet been explored.

Second, while alternative asset pricing models have been employed to measure the Ivol (*e.g.*, Fama and French, 1993; Carhart, 1997), and also generalized autoregressive conditional heteroscedasticity (GARCH)-class models on alternative asset-pricing models – to estimate conditional Ivol – liquidity plays a vital role in firm performance, and stock returns are expected to respond to it. Liquidity affects investment, as illiquid stocks cost more to buy, and sell for less and, hence, illiquidity reduces the expected return of stocks. Nevertheless, no study uses a liquidity-augmented five-factor asset-pricing model to estimate Ivol in a developed or emerging market; this is the first study to do so.

Third, investors may hold under-diversified portfolios because of idiosyncratic risk pricing as a component of total risk in any specified portfolio in imperfect capital markets such as India. Thus, under-diversified portfolios demand an extra risk premium. The present study account for such premium and thus extend the literature on EMs.

Fourth, unlike developed markets, where retail investors dominate equally, institutional investors largely dominate the Indian stock market. Markets are informationally inefficient in EMs such as India (Hiremath, 2014), in which institutional investors irrationally trade against market fundamentals that lead to the increase in total risk, including the idiosyncratic risk of the portfolio. The remainder of the paper is organized as follows. Section 2 presents the related theoretical and empirical research. Section 3 explains the methodology. Section 4 discusses the variables and empirical results. Section 5 presents the conclusion.

2. Idiosyncratic volatility and emerging markets

As recognition of the relevance of Ivol deepens, the literature on the role of company-specific characteristics that explain Ivol is growing. Pastor and Veronesi (2002) show that persistence of idiosyncratic risk changes during the life cycle of the firm. Chen and Petkova (2012) note that Ivol pricing depends on the standard deviation of the residuals of estimated asset-pricing models such as Fama and French (1993). Therefore, Ivol is sensitive to the factor loadings in the pricing models. These findings are compatible with the study of Ang et al. (2006, 2009), Berggrun et al. (2016), who conclude that stocks with high (low) Ivol provide low (high) expected returns, because assets provide hedging opportunities than the increase in the idiosyncratic risk of the stock. When average stock risk goes up, investment opportunities deteriorate. Therefore, investors are willing to pay an insurance premium for high Ivol stocks because their payoff is negative when average return variance is significant.

The pertinent literature shows that Ivol is a new dimension to Markowitz's (1952) theory. Hence, the Ivol is expected to be all the more important in EMs, which are characterized by a number of market frictions and lack of information. The peculiar features and frictions in EMs pose more challenges to the theory of finance and portfolio investment than do developed markets. The lack of tradable fixed income instruments makes the financial valuation further difficult. Hence, Bruner et al. (2003) suggest that portfolio managers in EMs need to depart from conventional investment practices, and global investors need to adapt to this peculiar structure and develop alternative tools to analyze and make investment decisions in these markets.

Emerging markets are accumulating capital at a faster rate than developed markets, and their market capitalization and share in world capitalization is growing, but they lag far behind developed markets, such as the US and European markets, in terms of growth, number of stocks listed, foreign investment, liquidity, and risk. In a global portfolio, Harvey (1995) advocate, weight needs to be assigned to these markets to generate higher returns because of growth potential.

Some important features of EMs are higher transaction costs, multiple tax regimes, lack of transparency, illiquidity, non-synchronous trading, substandard accounting systems, lack of regulations, and weak enforcement of contracts. Financial markets cannot function smoothly because the physical and institutional infrastructure is poor or underdeveloped, and governance is weakened by corruption, an uncertain legal environment, political instability, and lack of transparency. The extant literature suggests that these markets are informationally inefficient (Hiremath and Kumari, 2014), and Lagoarde-Segot and Lucey (2008) show that liberalization and trading infrastructure is necessary but not sufficient to improve the quality of information in EMs. As the EMs integrate with developed markets, the higher positive correlation exposes these markets to global shocks and volatility (Nasser and Hajilee, 2016). Often, during crises, EMs devalue their currency, and fuel exchange rate volatility which, in turn, affect global portfolios. As institutions and infrastructure are weak, EMs rarely experience benefits from foreign portfolio investment (FPI) as documented in the theoretical literature; rather, shocks trigger FPI outflows and higher volatility. Against this backdrop, Ivol assumes further significance in EMs.

From the empirical perspective, if the idiosyncratic risk of a given security can be potentially mis-estimated because of limited information in the EMs, firm characteristics related to idiosyncratic risk provide supplemental information to risk analysis. If firm-specific fundamentals play a significant role in explaining the idiosyncratic risk at cross-sectional securities, these unique fundamentals can be good predictors of Ivol, and can be used in forecasting the risk of an existing portfolio of securities over time. So far, researchers have focused on the practical relevance of the theory and on the cross-sectional relationship between Ivol and expected cross-sectional returns, but investigation into the practical implications of these relationships and the determinants of idiosyncratic risk has been scant.

We attempt to fill these gaps and extend the literature by investigating whether firm-specific characteristics play any role in determining trends in Ivol and by attempting to explain its future dynamics in EMs such as India. With its institutional heterogeneity, the Indian stock market provides an interesting opportunity to examine the issue. The characteristics of India are peculiar and hardly