The Quarterly Review of Economics and Finance 61 (2016) 53–63

Contents lists available at ScienceDirect

The Quarterly Review of Economics and Finance

journal homepage: www.elsevier.com/locate/qref

Investor sentiment and aggregate volatility pricing

Chiraz Labidi [a,*], Soumaya Yaakoubi [b]

[a] Department of Economics and Finance, College of Business and Economics, United Arab Emirates University, PO Box 15551, Al Ain, United Arab Emirates
[b] Laboratory of Applied Economics and Finance, University of Carthage, Carthage 2016, Tunisia

ARTICLE INFO

Article history:
Received 7 April 2015
Received in revised form 28 October 2015
Accepted 10 November 2015
Available online 22 November 2015

Keywords:
Investor sentiment
Asset pricing
Implied market volatility
Aggregate volatility
VIX

JEL classification:
G11
G12
G14
G17

ABSTRACT

This paper aims at providing new insights on the pricing of aggregate volatility risk by incorporating investor sentiment in the relation between sensitivity to innovations in implied market volatility and expected stock returns. Using both cross-sectional and time series analysis, we investigate the effect of the exposure to aggregate volatility risk on stock returns in both high-sentiment and low-sentiment regimes. We find that exposure to aggregate volatility risk is negatively related to returns when sentiment is low. However, this relation loses its significance when sentiment is high. The documented negative relation is robust to controls for other variables and to the use of various sentiment proxies, suggesting that aggregate volatility risk is an independent risk factor only during low sentiment periods.

1. Introduction

Studies by Ang, Hodrick, Xing, and Zhang (2006), DeLisle, Doran, and Peterson (2011), Chang, Christoffersen, and Jacobs (2013), and more recently Cremers, Halling, and Weinbaum (2015) reveal that aggregate volatility is a priced risk factor in the cross-section of stock returns. This finding can be explained theoretically within the Intertemporal Capital Asset Pricing Model (ICAPM) framework of Merton (1973) based on the hypothesis that an increase in market volatility represents a deterioration in the future investment opportunity set[1]. Using ICAPM intuition, risk averse investors should find assets whose payoffs are positively (or less negatively) related to volatility risk desirable as they enhance their hedging ability against unfavorable shifts in the investment opportunity set (Campbell, 1993, 1996; Chen, 2003; Campbell, Giglio, Polk, and Turley, 2012). The high demand for such assets by risk averse investors drives their prices up, resulting in lower expected returns. Consequently, market-wide volatility risk should be negatively priced in the cross-section of stock returns.

In traditional asset pricing models, such as the ICAPM, investor sentiment does not influence asset prices[2]. Yet, behavioral finance theories emphasize the relevance of investor sentiment in asset pricing (e.g. DeLong, Shleifer, Summers, & Waldmann, 1990; Shleifer & Vishny, 1997) and recent empirical studies provide overwhelming evidence that investor sentiment affects significantly stock returns[3]. Given these findings, an investigation of the impact of investor sentiment on the validity of "rational" asset pricing and more precisely on the pricing of aggregate volatility in the cross section of stock returns seems worthwhile.

Using three different proxies of investor sentiment, the goal of this paper is to explore the persistence of aggregate volatility as a priced risk factor in the cross-section of stock returns across different sentiment states. We argue in favor of a strong negative relation between innovations in market-wide volatility and expected returns during low sentiment periods, but this relation

* Corresponding author. Tel.: +971 55 952 9185.
E-mail addresses: labidi@uaeu.ac.ae (C. Labidi), yaakoubisoumaya@yahoo.fr (S. Yaakoubi).

[1] French, Schwert, and Stambaugh (1987) and Campbell and Hentschel (1992) document that periods of high volatility coincide with downward market moves or recessions (periods of low consumption).

[2] Investor sentiment can be broadly defined as an excessive optimism or pessimism about the market's prospects which is caused by investors' errors of judgment and not justified by fundamentals.

[3] E.g. Brown and Cliff (2004), Brown and Cliff (2005), Baker and Wurgler (2006); Baker and Wurgler (2007); Baker, Wurgler, and Yuan (2012).

http://dx.doi.org/10.1016/j.qref.2015.11.005

weakens during high sentiment periods. This idea rests on two common assumptions in the literature.

First, in accordance with previous behavioral studies (e.g. Baker & Wurgler, 2006, 2007), we assume that there are two types of investors: rational traders (i.e. arbitrageurs) and sentiment traders, who could be either optimistic or pessimistic about the market's prospects. Unlike arbitrageurs who form correct expectations regarding the future value of an asset, sentiment traders make systematically errors in judgment leading them to over or underestimate asset prices depending on their sentiment.

Second, sentiment traders will only be active in the market when their valuations are higher than those of rational traders—i.e. when the aggregate sentiment is high and when the market, as a result, is overvalued. However, when the sentiment of irrational traders is low, their reluctance to short keeps them out of the market. This assumption is consistent with the intuition of Miller (1977) who argues that, in the presence of short sale constraints, prices tend to reflect the most optimistic valuation of market participants. Baker and Stein (2004) also show that sentiment traders are more likely to trade when their sentiment is positive.

Prompted by these assumptions, we expect that on one hand, in high sentiment periods, the market is dominated by sentiment traders who are overly optimistic which tends to weaken the relation between aggregate volatility risk and expected returns. Indeed, when sentiment traders are overoptimistic, they require a smaller compensation for risk (Yu & Yuan, 2011). As a result, their demand for stocks that hedge against unfavorable changes in market volatility is lower and the effect of the sensitivity to market volatility risk on stocks expected returns is less important.

On the other hand, during low sentiment periods, prices should reflect rational traders' opinions since sentiment traders stay out of the market. In this setting, rational investors hedge against changes in future volatility by acquiring stocks with a higher sensitivity to changes in market volatility. The demand for such stocks increases their prices contemporaneously and thus reduces their future expected returns.

Following Ang et al. (2006), we consider changes in the Chicago Board Options Exchange (CBOE) volatility index (VIX) to proxy for innovations in aggregate volatility and estimate factor loadings on market implied volatility changes using individual stocks' daily returns. We then sort stocks into quintile portfolios according to their factor loadings and examine their returns during high and low sentiment periods, separately, while controlling for other risk factors.

We find a substantial negative and significant return differential between the stocks with the highest and the lowest return sensitivity to aggregate volatility when sentiment is low whereas no evidence of a significant return differential is obtained when sentiment is high. This finding confirms the intuition that investors want to hedge against changes in aggregate volatility only during low sentiment periods.

Using three sentiment proxies to forecast the returns of a long-short portfolio conditional to the sensitivity to aggregate volatility risk, we find a significant impact of investor sentiment on the return of a hedge portfolio buying stocks with high and selling stocks with low sensitivities to innovations in aggregate volatility. Our results are robust to the incorporation of market, size, book-to-market, momentum and liquidity factors.

Consistent with the results of the portfolio sorts, using Fama and MacBeth (1973) regressions, we also obtain a significant price of aggregate volatility risk, only in low sentiment periods, indicating that, during such periods, investors require a compensation in order to hold assets that depreciate when market volatility rises.

Overall, our findings reveal that in high-sentiment periods, the relation between aggregate volatility risk and expected returns is weaker probably due to a higher participation by sentiment traders, whereas, during low-sentiment periods, prices reflect rational traders' opinions and incorporate a premium that accounts for the sensitivity to changes in market volatility.

Our study contributes to a recent literature that emphasizes the importance of investor sentiment in asset pricing. One stream of this literature investigates the relationship between investor sentiment and market anomalies. Stambaugh, Yu, and Yuan (2012, 2014) find that sentiment affects the degree of mispricing generated by a broad set of anomalies. Antoniou, Doukas, and Subrahmanyam (2013) show that momentum profits arise only in optimistic periods and Livnat and Petovits (2009) report that stock price reactions to earnings surprises and accruals are influenced by the level of investor sentiment.

Other recent studies have focused on the relation between investor sentiment and standard asset pricing models. Ho and Hung (2009) find that adding investor sentiment as conditioning information in asset pricing models improves the overall model performance in explaining the dynamics of stock returns. Antoniou, Doukas, and Subrahmanyam (2015) show that although the CAPM beta appears not to be priced in the cross section of stocks, a significant positive relation between returns and the beta exists during periods of pessimistic sentiment. Yu and Yuan (2011) document the influence of investor sentiment on the market's mean-variance tradeoff. They find that the stock market expected return is positively related to the market's conditional variance in low-sentiment periods but unrelated to variance in high sentiment periods. Gao, Yu, and Yuan (2012) find that investor sentiment plays a crucial role in the puzzling relation between idiosyncratic volatility and expected stock returns. They argue in favor of a strong negative relation between idiosyncratic volatility and expected stock returns during high-sentiment periods while there is no discernable relation during low-sentiment periods.

Our study is also connected to Shen and Yu (2013). They explore the role of investor sentiment on the pricing of 10 macro-related risk factors, including aggregate volatility. They fail to find evidence of "rational" risk factors pricing but they argue that stocks with high exposure to macroeconomic shocks earn significantly higher returns than stocks with low exposure, only during low-sentiment periods. While they rely on monthly historical volatility as a proxy for aggregate market volatility and find no evidence of aggregate volatility pricing in the cross-section of stock returns, our study differs from theirs in that we follow Ang et al. (2006) and use changes in the VIX index constructed by the CBOE to estimate the innovations in aggregate volatility. The VIX index represents a forward-looking proxy of market volatility and is hence consistent with the idea that a state variable ought to reflect changes in the future prospects, in order to be considered as a relevant risk factor (Chen, 2003). Several studies also provide strong evidence that the use of implied rather than historical volatilities improves the estimation precision (e.g. Jiang & Tian, 2005). Moreover, using the VIX index allows us to confirm the pricing of aggregate volatility risk in the cross-section of stock returns and to build on previous findings while incorporating the investor sentiment.

The remainder of this paper is organized as follows. Section 2 describes the data. Section 3 explains the methodology and presents the empirical results from time series and cross-sectional analysis. Section 4 concludes.

2. Data

The cross-sectional relation between aggregate volatility risk and expected returns is examined for all stocks traded in the New York Stock Exchange (NYSE) from August 2001 to December 2008,