Pacific-Basin Finance Journal 40 (2016) 49–58

Contents lists available at ScienceDirect

Pacific-Basin Finance Journal

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

Buy-sell imbalance and the mean-variance relation

Chunpeng Yang, Yun Jia *

School of Economics and Commerce, Finance and Security Center, South China University of Technology, Guangzhou 510006, China

ARTICLE INFO

Article history:
Received 6 April 2016
Received in revised form 21 July 2016
Accepted 26 August 2016
Available online 28 August 2016

Keywords:
Buy-sell imbalance
Mean-variance relation
Time-varying effect
Volatility

ABSTRACT

Buy-sell imbalance is a crucial behavioral factor in the stock market. This paper emphasizes that buy-sell imbalance plays a systematic role in the market's mean-variance relation. Besides, the influence of buy-sell imbalance on the market's mean-variance relation is time-varying. As buy-sell imbalance is negative, the market's mean-variance relation is significantly negative; as buy-sell imbalance is positive, the market's mean-variance relation is insignificant. Furthermore, our analyses are robust across different conditional variance models and market portfolios with different values of stock capitalization.

1. Introduction

Understanding how buy-sell imbalance affects the mean-variance relation is a central issue in finance. In particular, Shiller (2014) points out that researches in light of actual human behavior should take account of how people really think and act. In some degree, buy-sell imbalance could stand for how people really act.

Numerous previous studies debate the mean-variance relation based on two channels. One is the theoretical study, and there exist inconclusive results for the mean-variance relation. Specifically, mainstream theory predicts a positive relation between the expected return and variance (e.g., Merton, 1980, 1973), while some researchers demonstrate that the mean-variance relation is not necessarily positive (e.g., Abel, 1988; Backus and Gregory, 1993; Whitelaw, 2000). The other is the empirical study, and researchers find conflicting empirical evidence on the mean-variance relation. In particular, some studies show a positive mean-variance relation (e.g., Campbell and Hentschel, 1992; French et al., 1987; Lundblad, 2007; Nyberg, 2012), while others present a negative relation between the expected return and variance (e.g., Brandt and Kang, 2004; Glosten et al., 1993; Harvey, 2001; Turner et al., 1989). Moreover, some empiricists discover an insignificant mean-variance relation (e.g., Baillie and DeGennaro, 1990; Chan et al., 1992; Koopman and Hol Uspensky, 2002). That is, there exist the conflicting conclusions of the mean-variance relation in both theoretical analysis and empirical analysis. Specifically, many extant studies consider that the results of the mean-variance relation are sensitive to selection of conditional variance models (e.g., Ghysels et al., 2005; Harvey, 2001; Lundblad, 2007; Yu and Yuan, 2011). However, from the standpoint of investor sentiment, Yu and Yuan (2011) discover the robust results about the mean-variance relation across different conditional variance models. Besides, investor sentiment is a vital behavioral factor in the stock market. Thus, it is clearly important to study the mean-variance relation from the standpoint of behavioral factors. Because investor sentiment is only one of behavioral factors, it is meaningful to investigate the mean-variance relation from the standpoint of other behavioral factors, such as buy-sell imbalance.

* Corresponding author at: School of Economics and Commerce, Finance and Security Center, South China University of Technology, Guangzhou, China.
E-mail addresses: chpyang@scut.edu.cn (C. Yang), jiayungroup@outlook.com (Y. Jia).

http://dx.doi.org/10.1016/j.pacfin.2016.08.007
0927-538X/

Many studies in finance argue that buy-sell imbalance has an impact on the excess returns. Barber et al. (2009) demonstrate that the future returns are associated with buy-sell imbalance of retail investors. Besides, Kumar et al. (2013) show that return comovements can be explained by buy-sell imbalance of retail and institutional investors. Specifically, Yang and Zhou (2015) find that both market buy-sell imbalance and market investor sentiment have impacts on the excess returns. While at the same time, researchers state that buy-sell imbalance may affect the volatility in stock market. Kyle (1985) predicts that the price volatility is caused by buy-sell imbalance. Moreover, Chan and Fong (2000) suspect that buy-sell imbalance may have an important influence on the volatility-volume relation after considering the roles of the number of trades and the size of trades. Furthermore, Li and Wang (2010) discover a significantly negative relation between volatility and institutional buy-sell imbalance in a retail investor-dominated emerging market. That is, buy-sell imbalance plays a systematic role in the excess returns and the volatility. Motivated by these studies, we investigate the influence of buy-sell imbalance on the mean-variance relation.

Following the algorithm of Lee and Ready (1991), some researchers use transaction data to classify trades as buyers or sellers and then construct buy-sell imbalance index (e.g., Chen et al., 2015; Kumar et al., 2013; Lee et al., 2010; Malmendier and Shanthikumar, 2007; Yang and Zhou, 2015). Specifically, buy-sell imbalance index formed by Yang and Zhou (2015) represents the imbalance of stock index between the buy and the sell. That is, it depicts the irrational behavior of all investors (composed of institutional investors and retail investors). In this paper, we use buy-sell imbalance index constructed by Yang and Zhou (2015) to classify our sample as two periods, a period of positive buy-sell imbalance and a period of negative buy-sell imbalance, and then study the market's mean-variance relation under two regimes. We discover that buy-sell imbalance has a significant effect on the market's mean-variance relation. Besides, we find a non-linear and time-varying relation between the market's expected excess returns and the conditional variance: In the periods of negative buy-sell imbalance, the market's expected excess returns are negatively associated with the volatility; in the periods of positive buy-sell imbalance, the difference between the two regimes is significantly positive and the market's mean-variance relation is insignificant. More importantly, there exist two striking features in our paper. Firstly, this paper innovatively investigates the market's mean-variance relation from the standpoint of buy-sell imbalance. Secondly, our results are robust across different conditional variance models and market portfolios with different values of stock capitalization.

In summary, we make several contributions to this paper. On the one hand, this paper highlights that buy-sell imbalance, which is an important behavioral factor in the stock market, has a vital influence on the market's mean-variance relation. On the other hand, this paper shows a time-varying market's mean-variance relation between two regimes which are classified by buy-sell imbalance. To be specific, the market's mean-variance relation is statistically significantly negative during the periods of negative buy-sell imbalance, while the market's mean-variance relation is insignificant during the periods of positive buy-sell imbalance. What's more, our empirical results are robust and do not rely on the approach to modeling the conditional variance and the value of stock capitalization.

The rest of this paper is organized as follows. Section 2 describes four volatility models, buy-sell imbalance index and the summary statistics. Section 3 provides the main empirical results. Section 4 considers robustness tests. Section 5 concludes.

2. Data

2.1. The Conditional Variance

There exist ongoing debates about the sign of the mean-variance relation. Some researchers point out that such results appear to be particularly sensitive to the measurement of the conditional variance (e.g., Ghysels et al., 2005; Harvey, 2001; Lundblad, 2007; Yu and Yuan, 2011). Thus, we introduce four conditional variance models which are widely used by researchers, and then use them in the rest of this paper.

2.1.1. The Conditional Variance in Moving Average Model

The moving average model, which is proposed by Brock et al. (1992), is a natural selection of conditional variance. This model considers the realized variance from time $t-19$ to time t as the conditional variance on day $t+1$:

$$Var_t(R_{t+1}) = \sum_{d=0}^{20-1} (r_{t-d}-\bar{r})^2/(20-1). \quad (1)$$

Where $Var_t(R_{t+1})$ represents the market portfolio's conditional variance; r_{t-d} represents the daily return of the market portfolio on day $t-d$; and $\bar{r}$ represents the daily average return from time $t-19$ to time t.

2.1.2. The Conditional Variance in Exponentially Weighted Moving Average Model

In this paper, the exponentially weighted moving average model built by J.P. Morgan (1996) is the second volatility model. The exponentially weighted moving average model is better than the moving average model, on account of the longer historical data