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Gambler's attention and the mean-variance relation: Evidence from China

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ABSTRACT

Research from psychology suggests that gambler's fallacy and limited attention matter for individual decision making involving risk. We dub this combination "gambler's attention" and use it to provide a behavioral perspective on the debate over the market's mean-variance relation. A gambler's attention index is developed to divide the sample period into high-attention and low-attention regimes. Using data from China, we find clear-cut evidence that the market's mean-variance relation is significantly positive in low-attention periods but not in high-attention periods. The results are consistent with the notion that gambler's attention undermines an otherwise positive risk-return tradeoff in high-attention periods.

1. Introduction

Is there a risk-return tradeoff for the aggregate stock market? On the theoretical side, it has been known since Merton (1980) that the market's expected return should be positively related to its variance in a rational asset pricing model. The underlying intuition is straightforward: rational investors require risk compensation for bearing volatility. Yet, the evidence so far is weak: the estimates of the market's mean-variance relation have often been found to be insignificant (e.g., Campbell and Hentschel, 1992) or even of the negative sign (e.g., Nelson, 1991). In this paper, we contribute towards a possible understanding of the mean-variance debate by following two concepts from the psychology of decision making.

The first concept is gambler's fallacy, which suggests that individuals have an inappropriate propensity to believe in the trend reversal (e.g., Hirshleifer, 2001). Consistent with this negative recency effect, a strand of recent empirical research in finance has shown that individual investors tend to buy stocks following negative returns (e.g., Kaniel et al., 2008). This raises the possibility that negative returns are cues for unsophisticated investors to form gambling beliefs. The second concept is limited attention, due to which salient characteristics are key to hooking our attention (e.g., Hirshleifer, 2001). Recent research has also emphasized the role of limited attention in shaping investor behavior, e.g., causing individual investors to buy stocks following extreme (positive and negative) returns (Barber and Odean, 2008). In this sense, extreme returns can serve as cues for unsophisticated investors to form speculative beliefs. Following up the above insights, we conjecture that the combination of gambler's fallacy and limited attention will lead investors to buy stocks exhibiting salient negative returns more than implied by rational beliefs because both cognitive biases can then contribute to an investor being willing to sacrifice risk compensation associated with holding risky stocks. We refer to this combination as *gambler's attention*.

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The relevance of gambler's attention to the mean-variance debate is the concern that salient negative returns are important cues for unsophisticated investors to form their speculative beliefs at the cost of risk compensation. As a result, although a positive risk-return tradeoff can exist in a market when it is dominated by rational investors, gambler's attention can undermine this fundamental relation when the salience of negative stock returns become significant enough at the market level because it makes investors on average demand lower risk compensation for bearing volatility.

In this paper, we perform some tests to determine whether our argument is plausible. Specifically, we test it on the mainland Chinese stock market using a marketwide indicator of extreme negative returns as a measure of gambler's attention. Following the empirical designs of Yu and Yuan (2011), we use this gambler's attention index to distinguish between high- and low-attention periods and study whether this two-regime perspective can help us better understand the mean-variance relation in China. The Chinese market is an interesting laboratory for investigating this behavioral argument as this largest emerging stock market is primarily dominated by unsophisticated individual investors.[1] Using the data over the 1997 to 2016 period, we find clear-cut evidence that the market's expected excess return is positively related to its conditional variance in low-attention periods but not in high-attention periods. The empirical results are robust across A-share equal-weighted and value-weighted returns, and across two widely-used volatility models.

Meanwhile, we cannot observe similar two-regime mean-variance results when regimes are formed by alternative marketwide variables, specifically, an indicator of negative returns (i.e., a proxy of gambler's fallacy) and an indicator of extreme positive returns (i.e., a proxy of limited attention). In this sense, it is hard to explain the strong two-regime pattern merely with either gambler's fallacy or limited attention. The results highlight the unique role of gambler's attention in undermining the fundamental risk-return tradeoff.

The premise that high salience of negative stock returns can cause a big impact of gambler's attention on stock pricing is at the heart of our argument, and distinguishes our theory from other proposed explanations of the puzzling mean-variance relation. In a related study, Yu and Yuan (2011) use the investor sentiment index developed by Baker and Wurgler (2006) to identify high- and low-sentiment periods and study this index's ability to explain the mean-variance relation in the U.S. stock markets. The present work is different from their study in the country, regime-forming variable, and source of the puzzling mean-variance relation. Baker and Wurgler (2006) construct their broad sentiment index by using a principal component method to compose six measures of investor sentiment: the closed-end fund discount, the NYSE share turnover, the number of IPOs, the average first-day return of IPOs, the equity share in new issues, and the dividend premium. None of these market variables is used in this paper and our gambler's attention index is instead constructed based on the cross-sectional distribution of all individual stock returns traded in the market. In fact, by their construction methodology, the investor sentiment indicators in the existing literature, including the Baker-Wurgler index, primarily reflect the sentiment associated with positive stock returns. In contrast, our focus in this paper is on the gambling beliefs occurring when negative returns attract investor attention. Furthermore, given the fact that the Baker-Wurgler index is a broad sentiment index, the study of Yu and Yuan (2011) can speak little about how investors actually form their beliefs or preferences or what cognitive biases matter. In this paper, we propose and confirm that two specific cognitive biases, gambler's fallacy and limited attention, are helpful in understanding the puzzling patterns of the market's mean-variance relation.

The remainder of the paper is organized as follows: Section 2 introduces the data, the gambler's attention index and the two volatility models. Section 3 reports the main empirical results and gives some robustness tests. Section 4 concludes the paper.

2. Data and methods

2.1. Data

The data are obtained from China Stock Market and Accounting Research (CSMAR) database for the period January 1997–December 2016, covering a total of 240 months. We collected the entire set of A-shares that are listed in China (720 stocks in 1997 and 2881 stocks in 2016). We use the A-share equal- and value-weighted returns as proxies for stock market returns. The monthly market excess return (R) is calculated as the realized monthly market return minus the one-month interest rate in China.

2.2. An index of gambler's attention

As stated in Introduction, the gambler's attention hypothesis suggests that negative stock returns are important cues for investors to form their speculative beliefs. We measure the aggregate salience of negative stock returns on a monthly basis via the empirical percentile of the cross-sectional distribution of individual stock returns, which we label as the gambler's attention index. For month t, our gambler's attention index is defined as the absolute value of 1th percentile (P_1) of log monthly return distribution pooled across all A-shares in the market over the past two months, i.e.,

$$GA_t = \left|P_1\left(r_t^1, r_{t-1}^1, \ldots, r_t^i, r_{t-1}^i, \ldots r_t^n, r_{t-1}^n\right)\right|, \tag{1}$$

[1] A basic logic in behavioral finance is the concern that the aggregate demand shifts from unsophisticated investors have the potential to generate mispricing, especially when investor sophistication is low and there are limits to arbitrage (e.g., Barberis and Thaler, 2003).