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Market volatility and momentum

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ABSTRACT

We investigate the predictive power of market volatility for momentum. We find that (1) market volatility has significant power to forecast momentum payoffs, which is robust after controlling for market state and business cycle variables; (2) market volatility absorbs much of the predictive power of market state; (3) after controlling for market volatility and market state, other variables do not have incremental predictive power; (4) the time-series predictive power of market volatility is centered on loser stocks; and (5) default probability helps explain the predictive power of market volatility for momentum. These findings jointly present a significant challenge to existing theories on momentum.

1. Introduction

We examine the predictive power of market volatility for momentum profitability. A direct motivation for our study arises from the observation that the high stock market volatility in late 2008 is followed by a string of dramatic losses of momentum strategies. After the bankruptcy of Lehman Brothers in September, market volatility skyrocketed, which was followed by strikingly large momentum losses. In the first half of 2009, the momentum strategy performed miserably, producing a monthly average payoff of −17% (Fig. 1).[2] The momentum strategy also performs poorly following other periods of skyrocketed volatility, such as in the early 1930's, the middle 1970's, and around the turn of the century after the burst of the NASDAQ bubble. These drastic episodes suggest that market volatility may predict momentum profits.

While there exists an extensive literature on the momentum effect of Jegadeesh and Titman (1993), empirical studies are overwhelmingly aimed at cross-sectional features of the anomaly. Time-variation in momentum profits has received relatively less attention. Important exceptions include Chordia and Shivakumar (2002; hereafter CS), who find that momentum varies with business cycles, Cooper, Gutierrez, and Hameed (2004; hereafter CGH), who find that momentum exists only in the "UP" market state, and Stivers and Sun (2010), who find that cross-sectional return dispersion negatively predicts momentum payoff.[3] In this paper, we investigate whether market volatility has predictive power for time-variation in momentum payoff.

Our tests reveal a set of interesting findings. First, market volatility indeed has significant and robust power to forecast momentum payoffs. Unlike market state and business cycle variables, market volatility has significant explanatory power even when the

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[2] The strategy's monthly payoffs for January through June 2009 are −17.02%, 3.40%, −23.49%, −40.62%, −23.23%, and −1.85%, respectively.

[3] Cooper, Gutierrez, and Hameed (2004) define that it is an "UP" ("DOWN") market state if the past three-year market return is non-negative (negative). For convenience, we will use a positive market state instead of a non-negative market state. Unless noted otherwise, this definition is used throughout our paper.

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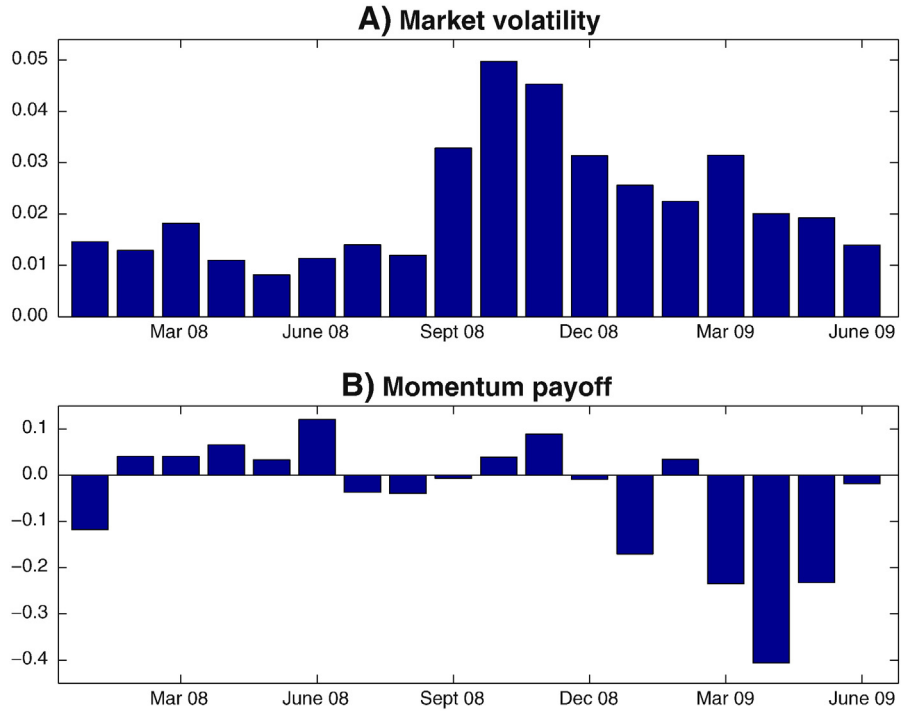

Fig. 1. Market volatility and momentum payoff in the 2008–2009 episode. Panel A plots market volatility (standard deviation of daily market returns) in the month. Panel B plots the payoffs to a momentum strategy. The data for momentum payoffs are from the Ken French data library. Specifically, stocks are sorted into deciles based on returns from month t − 12 to month t − 2, where month t is the holding period. The momentum payoff is the difference between equal-weighted returns of the winner and loser portfolios.

momentum portfolios are constructed using relatively large stocks. Second, the predictive power of market volatility persists after controlling for market states and business cycle variables. In contrast, these other variables lose much of their explanatory power in the presence of market volatility. Only market state continues to have predictive power for momentum profitability. Third, the predictability of momentum profits arises mainly from loser stocks. Performance of the winner stocks does not deviate from the overall market performance in a predictable way. We use the market index and the Fama and French three-factor model as the benchmark to adjust the performance of winners and losers. Finally, inspired by the fact that market volatility is related to default probability and that the predictability is loser-centered, we explore the role of default probability and find that default probability can absorb much of the predictive power of market volatility for momentum profitability.[4]

We also examine other potentially important variables in predicting momentum profitability, including investor sentiment (Baker and Wurgler (2006)), cross-sectional stock return dispersion (Stivers and Sun (2010)), and Chicago Board Options Exchange Volatility Index (VIX). Cross-sectional return dispersion and VIX are highly correlated with market volatility. The correlation coefficients are 0.52 and 0.71, respectively. We confirm Stivers and Sun (2010)'s finding that cross-sectional return dispersion negatively predict momentum performance. We also find that investor sentiment and VIX can predict momentum profitability. In the presence of these variables, the predictive power of market volatility remains robust. In contrast, the predictive power of these variables is not robust in the presence of market volatility.

Our study extends previous work on time-series features of momentum in three aspects. First, existing work aims at testing certain theories. For example, CGH (2004) aim at testing the models of Daniel, Hirshleifer, and Subrahmanyam (1998) and Hong and Stein (1999). CS (2002) focus on the role of business cycles in explaining momentum. In contrast, our goal is to establish the predictive power of a particular variable (market volatility) for momentum profitability. Second, our new findings, centered on market volatility, are challenging for existing theories. They are not readily reconciled with the studies of CS and CGH that are motivated by the business cycle risk explanation and the behavioral theories. Third, our findings are intriguing when compared with numerous cross-sectional studies. The results of Jiang, Lee, and Zhang (2005) and Zhang (2006), for example, show that momentum payoffs are higher among firms with higher information uncertainty. However, we find that over time high volatility periods are followed by low momentum payoffs.

Although momentum is largely a cross-sectional effect, our study shows that the time-series dimension is important as well for developing a convincing theory of momentum. Overall, our findings present a significant challenge to existing research on

[4] With data from January 1971 to June 2008, we use the approach of Hillegeist et al. (2004), which is based on the Black–Scholes–Merton option-pricing model, to estimate bankruptcy probabilities of firms (hereafter referred to as BSM probs). We find that the average BSM probs across all stocks is significantly correlated with market volatility. Our tests that focus on down markets show that both the all-stock average BSM probs and the loser-winner difference in BSM probs have significant predictive power for momentum. These default risk proxies take away the explanatory power of market volatility.