The role of firm investment in momentum and reversal[☆]

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ABSTRACT

We propose that the time delay inherent in firm investment is what creates the time delay in stock returns observed in the momentum and reversal regularities. We provide intuition for our hypothesis and show empirically that indeed the momentum and reversal effects occur not in isolation, but are concurrent with systematic patterns in firm investment. For example, winners only continue to win when there is also subsequent investment, and losers only continue to lose when there is also subsequent disinvestment. Although our paper is about understanding the nature of the price pattern delay rather than examining a trading strategy, our tests suggest ways to enhance trading returns. Our results provide novel evidence on a potential source of delay in momentum and reversals regularities.

1. Introduction

Despite a strong theoretical basis for the random-walk model of stock returns (Bachelier, 1900), evidence for predictable patterns in stock returns has mounted. Two particularly well documented patterns are the momentum and reversal effects.[1] These effects document that stocks that exhibit high (low) relative past returns tend to exhibit high (low) abnormal returns over "intermediate" horizons of 3–12 months (i.e., momentum) and low (high) abnormal returns over "long" horizons of 24–36 months (i.e., reversal). The central interesting feature of momentum and reversal is the persistent time delay in how prices evolve. If investors can anticipate momentum or reversal patterns, researchers question why competitive trading pressure does not eliminate these intermediate or long horizon effects by adjusting security prices immediately to reflect the anticipated returns. Why does the market delay in the realization of these anticipated returns? Identifying the source of this delay in equity price return adjustment remains a compelling research question.

The literature has proposed several hypotheses to explain the delay in price adjustment. Barberis et al. (1998) and Daniel et al. (1998) propose that investors maintain behavioral biases in updating their beliefs. Hong and Stein (1999) provide a model based on the interactions of investors that respond to different information to explain the price delay. Vayanos and Woolley (2013) propose a delay caused by the inertia associated with investment-fund flows.[2]

[1] See Jegadeesh and Titman (1993, 2001), Chan et al. (1996), and Rouwenhorst (1998) for the intermediate-term momentum effect, and DeBondt and Thaler (1985, 1987), and Cutler et al. (1991) for the long-term reversal effect.
[2] There is much related work worth citing. Conrad and Kaul (1998) suggest that momentum is simply a manifestation of the cross-sectional variation in firm returns and firm risk. Chordia and Shivakumar (2002), Johnson (2002), and Sagi and Seasholes (2007) argue for rational models based on time-varying risk exposure. Grundy

In this paper, we propose a new explanation for the time delay in returns observed in momentum and reversal. Our proposal emphasizes the role of firm investment in stock price behavior, and includes as a key feature the impact of time delay associated with realizing firm investment. We suggest that since real firm investment cannot be instantaneously executed, return patterns are delayed in time because investment realization is inherently delayed in time. Using a panel of U.S. CRSP-Compustat stocks, we show that momentum and reversal patterns in stock returns occur exclusively in concert with the predicted patterns in firm investment. For example, winners continue to win only when there is subsequent investment, and losers continue to lose only when there is subsequent disinvestment. We suggest that the momentum and reversal regularities in returns do not occur in isolation, but are dependent on systematic patterns in firm investment such that there is no residual momentum or reversal effect in stock returns independent of that associated with firm investment. While we do not empirically show causation, our results are consistent with a unique linkage between investment and both the momentum and reversal return regularities.

We motivate our proposal with two hypotheses based on simple motivating assumptions of the term-structure in returns and based on established relations. Our hypotheses result from three assertions. First, firm investment takes time to implement such that investment execution lags with some delay the manifestation of the investment opportunity. The delay in time inherent to real investment introduces uncertainty to its realization. Because of this delay the investor returns associated with the identification of an investment opportunity occur well before the investment is actually realized. A delay associated with investment is a standard assumption of neoclassical economics (see Samuelson, 1948). The delay horizon we envision is generally counted in months, not days or years. Second, firm investment is positively correlated with contemporaneous stock returns. A positive contemporaneous correlation between investment and returns is a simple implication of the realization of positive net present value projects. While investors may partially recognize the expected value associated with a project when it is identified, the realization of the uncertain portion of the value is rationally delayed until the time when the project is actualized by management. The uncertainty surrounding the realization of the investment can be attributed to a number of factors: asymmetric information between investors and the firm manager; time-varying discount rates (Cooper and Priestley, 2011); conflicting incentives, frictions, or behavioral biases within the firm (Jensen, 1986; Shleifer and Vishny, 1989; Malmendier and Tate, 2005); or behavioral biases in how investors capitalize investment (Cooper et al., 2008). Regardless of the source of the investment uncertainty, the separation of the identification of the opportunity from the execution of the opportunity divides the associated return realization of the investment into multiple parts. And third, firm investment is negatively correlated with subsequent stock returns. Empirical evidence as well as theoretical motivation on both a rational and behavioral basis for this third assertion is well established in the literature (see Carlson et al., 2004; Xing, 2008; Titman et al., 2004; Lipson et al., 2012). Combining these assertions generates the predictions of investment-based momentum and reversal effects that are at the heart of this paper.[3]

Some intuition for the investment-based momentum and reversal predictions is as follows. Because of the time delay in investment, security prices anticipate the gains to investment months before the investment occurs. Thus, positive stock returns precede investment as the returns reflect the anticipated investment opportunities. In the next period as investment is realized, security prices reflect the realized gains of the investment. This delayed return only reflects the value realized with the resolution of uncertainty that the investment is completed. It may, however, also reflect any behavioral bias in how investors capitalize firm investment (Cooper et al., 2008). This pattern in return and investment interaction generates a momentum effect as investment realization returns follow investment anticipation returns. The same is true for disinvestment. In this way, winners tend to win (as long as there is contemporaneous investment) and losers tend to lose (as long as there is contemporaneous disinvestment). Following investment, firms tend to experience lower stock returns (e.g., due to a reduction in the cost of capital that stimulated the investment or to a correction in investor pricing bias). This decline in returns is associated with the reversal pattern in stock returns as those firms that experience the positive return effect associated with the investment tend to experience lower returns following the investment. In this way firms with high pre-investment returns tend to have low post-investment returns. The opposite occurs for disinvestment. Thus, winners tend to lose over the long horizon (as long as there is contemporaneous investment) and losers tend to win over the long horizon (as long as there is contemporaneous disinvestment).

Motivated by such structure, we find that return continuation (momentum) and reversal exists only among those firms that expand following positive return shocks or contract following negative return shocks. In showing that the shape of the term structure in stock returns is inherently and jointly due to interactions between investment and returns, we propose important implications for the large literature on the momentum and reversals regularities.[4] Our explanation is holistic in that it jointly explains term-structure effects over both near-term and long-term time horizons. While our explanation does not necessarily require a rational or behavioral motivation, we provide some empirical evidence indicating that at least some of what we document has a behavioral foundation.

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and Martin (2001), Jegadeesh and Titman (2001), and Griffin et al. (2003) provide contradictory evidence to these rational-based explanations. Over longer horizons investor over reaction has been used to explain the reversal effect (DeBondt and Thaler, 1985). Lo and MacKinlay (1990), Brav and Heaton (2002), and Lewellen and Shanken (2002) provide rational-based models for reversals. Klein (2001) makes the case for a tax-based explanation for which George and Hwang (2004) provide corroborating evidence.

[3] In examining the underlying assumptions of our model we find strong correlation between past returns and investment, as well as investment and contemporaneous and future returns. These findings confirm the set up of our model of the importance of investment as the channel for explaining the term-structure effects of stock returns.

[4] Recently, Novy-Marx (2012) documents that the momentum effect is stronger with more distant returns (e.g., 7 to 12 months) than more recent returns (e.g., 2 to 6 months). His observation gives rise to a complicated term structure pattern in which return correlation is increasingly positive over the intermediate term before flipping to negative correlation with the reversal effect in the long-term. Although existing models of stock returns fail to explain this curious behavior in returns, the Novy-Marx finding is fully consistent with our model as the horizon of the momentum effect depends on the delay in investment not on the common views of momentum. A delay of six to 12 months in momentum effects is completely in line with a plausible delay in investment.