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The liquidity risk of liquid hedge funds ☆

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ABSTRACT

This paper evaluates hedge funds that grant favorable redemption terms to investors. Within this group of purportedly liquid funds, high net inflow funds subsequently outperform low net inflow funds by 4.79% per year after adjusting for risk. The return impact of fund flows is stronger when funds embrace liquidity risk, when market liquidity is low, and when funding liquidity, as measured by the Treasury-Eurodollar spread, aggregate hedge fund flows, and prime broker stock returns, is tight. In keeping with an agency explanation, funds with strong incentives to raise capital, low manager option deltas, and no manager capital co-invested are more likely to take on excessive liquidity risk. These results resonate with the theory of funding liquidity by Brunnermeier and Pedersen (2009).

1. Introduction

> If you thought getting into a hedge fund was tough, try getting out of one.
>
> Wall Street Journal, April 10, 2008

During the recent financial crisis, the use of redemption gates by hedge fund managers caught many investors by surprise. Gates allow hedge funds to limit the percentage of fund capital that can be redeemed by investors at any time. Hedge funds that raised gates include the large and hitherto successful Citadel, Tudor Investment Corp, Fortress Investment Group, and D.E. Shaw.[1] Fund managers argue that gates protect investors as they permit funds to liquidate in an orderly fashion and avoid selling assets at fire sale prices (Pulvino, 1998; Mitchell, Pedersen, and Pulvino, 2007). Investors contend that fund managers who raised gates, especially those who continue to levy management fees on gated capital, care more about business continuity than about investor protection. Underlying all this are concerns that the hedge fund industry suffers from an asset–liability mismatch.[2] Investors worry that a disparity could exist

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[1] See Wall Street Journal (2008a, 2008c).

[2] Asset–liability mismatches have other implications in finance. According to the Diamond and Dybvig (1983) model, the duration mismatch between banks' illiquid long-term loans and liquid short-term deposits can engender self-fulfilling bank runs. Similarly, according to Brunnermeier and Pedersen (2005), the asset–liability mismatch in the hedge fund industry could accelerate the demise of hedge funds that are experiencing difficulties and make them susceptible to predatory trading.

between the liquidity that hedge funds say they can provide and the liquidity of their underlying assets.

Motivated by these events, I study hedge funds that offer favorable redemption terms, i.e., monthly redemptions or better. These funds provide a fertile ground to search for instances in which hedge funds overpromise in terms of liquidity. I ask the following: How liquid are these liquid hedge funds? Do these hedge funds take on excessive liquidity risk? That is, are they forced to sell assets at fire sale prices in response to investor redemptions? If so, what drives the excessive liquidity risk-taking? To proxy for excessive liquidity risk, I use the impact of investor demand shocks on fund returns. In doing so, I leverage on the Brunnermeier and Pedersen (2009) concept of a loss spiral, a concept motivated by Shleifer and Vishny's (1992) work on asset fire sales. In a loss spiral, initial losses by speculators precipitate investor redemptions that force speculators to sell assets at fire sale prices, thereby inducing further investor withdrawals. According to Brunnermeier and Pedersen (2009), this interaction between market liquidity (the ease with which assets can be traded) and funding liquidity (the ease with which traders can obtain financing) can explain why liquidity can suddenly dry up, co-moves with the market, and has commonalities across securities. A major channel through which this interaction can occur is via hedge funds. Anecdotal evidence suggests that this channel has become more important as several investment banks have scaled back or wound down their proprietary trading operations following the 2008 financial crisis.[3]

The empirical findings are striking. Substantial variation exists in the liquidity risk of these liquid hedge funds. Within this group of funds, the portfolio of funds with high liquidity risk exposure outperforms the portfolio of funds with low liquidity risk exposure by 5.80% per year (t-statistic=2.26). To measure systematic liquidity risk exposure,[4] I use fund beta with respect to the Pástor and Stambaugh (2003) market-wide liquidity measure (henceforth PS measure).[5] The PS measure is particularly suited for gauging liquidity risk as it is based on temporary price changes accompanying order flow.[6] I account for risks that are not directly related to liquidity with the Fung and Hsieh (2004) seven-factor model. I adjust the bond factors from the Fung and Hsieh (2004) model appropriately for duration so that they represent returns on traded portfolios.[7] After adjusting for co-variation with these factors, the spread is 6.11% per year (t-statistic=2.58). The relation between liquidity risk exposure and fund performance also manifests in cross-sectional regressions. Controlling for other hedge fund characteristics, a one standard deviation increase in liquidity risk exposure is associated with a 2.20% per annum (t-statistic=2.90) surge in annual returns. These results reinforce those of Sadka (2010) who shows that liquidity risk, as measured by the Sadka (2006) information-driven, permanent-variable component of price impact, can explain the cross-sectional variation in hedge fund returns. Because the price impact of asset fire sales, as envisaged by Shleifer and Vishny (1992), is transitory and unrelated to information, I argue that the PS measure is more relevant for my purposes.

The aforementioned results suggest that hedge funds that grant favorable redemption terms differ significantly in terms of their appetites for liquidity risk. Moreover, the rewards for bearing liquidity risk are high. But do these hedge funds take on excessive liquidity risk? I show that liquidity risk exposure parlays into problems for hedge funds when investors deploy and redeem capital. On average, hedge funds that experience high inflows subsequently outperform hedge funds that experience low inflows by 4.79% per year (t-statistic=4.70) after accounting for co-variation with the factors from the Fung and Hsieh (2004) model. These results are robust to adjustments for backfill and incubation bias, fund fees, and thin trading-induced serial correlation in fund returns (Getmansky, Lo, and Makarov, 2004).

Consistent with a fire sale story, liquidity risk amplifies the effects of capital flows on fund returns, both in the cross-section and inter-temporally. Within the fund quintile with the highest exposure to liquidity risk, the flow portfolio abnormal spread is 4.97% per year. Conversely, within the fund quintile with the lowest exposure to liquidity risk, the spread is 2.84% per year. When the markets are bereft of liquidity, i.e., when the PS measure falls below its 20th percentile level, the flow portfolio abnormal spread is 9.13% per year. When markets are flushed with liquidity, i.e., when the PS measure rises above its 80th percentile level, the spread is only −1.48% per year. In addition, the spread is particularly large for months that are anecdotally associated with sharp contractions in market liquidity. For example, in August 1998, during

[3] See Financial Times (2009) and Wall Street Journal (2008b).

[4] The focus of this paper is on the concept of market liquidity as a non-diversifiable risk factor, i.e., systematic liquidity risk, and not on asset-specific liquidity characteristic, i.e., liquidity level. In the absence of complete fund holdings information, fund liquidity levels are often estimated using fund return serial correlation. Thus, by focusing on systematic liquidity risk, one can side-step issues such as the linear extrapolation of prices for thinly traded securities, the use of smoothed broker dealer quotes, and deliberate performance smoothing that plague serial correlation in hedge fund returns. See Getmansky, Lo, and Makarov (2004) and Bollen and Poole (2008).

[5] The PS measure is derived from the liquidity measures of individual stocks listed on the NYSE and the Amex. One concern is that hedge funds do not trade only US equities. However, there is mounting evidence that liquidity is correlated across stock and bond markets (Chordia, Sarkar, and Subrahmanyam, 2005; Goyenko and Ukhov, 2009) and across countries (Karolyi, Lee, and van Dijk, 2010). Therefore, the PS measure could reflect a general state of liquidity that encompasses markets other than just the NYSE and the Amex.

[6] There are many ways to capture liquidity risk. Because my goal is to relate liquidity risk to fire sales at hedge funds, liquidity risk measures derived from the temporary component of price impact such as the PS measure are more appropriate. Other measures of liquidity risk derived from price impact, such as that proposed by Acharya and Pedersen (2005), do not distinguish between temporary and permanent components of price changes accompanying order flow. Nonetheless, I show in robustness checks that the results are qualitatively similar when I employ the Acharya and Pedersen (2005) illiquidity measure.

[7] In a robustness test, to allow for hedge fund exposure to equity option-based strategies (Mitchell and Pulvino, 2001), I also augment the model with two out-of-the-money Standard and Poor's 500 option-based factors from the Agarwal and Naik (2004) model. These factors were generously supplied by Narayan Naik.