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# Momentum profits and time varying illiquidity effect

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ABSTRACT

We study the variations in the US momentum returns using shocks to contemporaneous and lagged market illiquidity. We assert that the momentum strategy is hedged against systematic illiquidity risk. The impact of systematic illiquidity risk on momentum profits is shown to be distinctive from the effect of supplying liquidity. Our results show that the contemporaneous effect of systematic illiquidity dominates the opposite prediction of lagged systematic illiquidity and retains its significance even if variables capturing the time varying exposures of momentum returns to market risk are included in the analysis.



## 1. Introduction

The technological developments in trading systems have reduced transaction costs and commissions and have contributed to an exponential increase in the trading volume of US stocks. Chordia, Subrahmanyam and Tong (2014) report that average returns on anomaly based trading strategies have decreased as the trading systems have become more advanced, which is consistent with limits to tradable arbitrage.[1] They report that an illiquidity based anomaly portfolio has 39% lower profits in the post-decimalization period than the pre-decimalization period. In itself this shows that the variability in profits is because of two distinctive liquidity attributes i.e. (i) supplying liquidity to facilitate trading and (ii) risk compensation for covariance between average returns and systematic market liquidity.[2]

Avramov, Cheng and Hameed (2015) report contrary empirical evidence specifically for momentum profits as market liquidity improves. They show that lagged market illiquidity predicts lower momentum returns and vice a versa. We argue that this effect is a conflation of the systematic liquidity effect and supplying trading liquidity. We hypothesize and show that ease in trading or supplying liquidity has not changed the systematic course of risk compensation of momentum profits.

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[1] They report that, among other proxies for arbitrage activity, the decrease in the tick size due to decimalization has approximately halved the return on prominent anomalies based trading strategies when compared with their historical average returns. They analysed a range of anomalies including size, momentum, illiquidity, asset growth and operating profitability.

[2] Liquidity is a broad concept and in asset pricing literature has been studied: (i) to represent stock specific idiosyncratic liquidity (for example Amihud and Mendelson, 1986), (ii) to describe the systematic nature of market liquidity to influence stock returns (for example Pastor and Stambaugh, 2003) and (iii) availability of effective trading platforms to facilitate trading (Chordia et al., 2014 and references therein).

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Furthermore, we argue that the negative relationship between momentum-liquidity available at previous period is consistent with risk aversive tendencies of investors' ex-ante opting for safe (liquid) stocks compared to systematic bargains with high sensitivities to a liquidity risk factor.

In order to test our assertion, we study the liquidity-momentum relationship for the US stocks. To examine the momentum-liquidity contemporaneous relation, we partition the whole sample into five quintiles with respect to shocks to market illiquidity.[3] The average returns across these five quintiles reveal that momentum profits are lowest when shocks to systematic liquidity improve market liquidity conditions and are highest when markets experience acute illiquidity shocks. Admittedly, momentum returns are hedged against shocks to systematic illiquidity.

Our direct tests show that illiquid shocks at the previous lag predict lower momentum returns but we find an even stronger reverse effect for the contemporaneous shocks to liquidity risk factor. In total, we posit a positive momentum-market liquidity relationship which is illustrated by the fact that the market clears risky claims for the expected returns with respect to their exposures to variations in systematic liquidity while holding others constant, i.e. as market illiquidity increases (decreases) momentum returns increase (decrease). We argue that as market liquidity conditions improve momentum returns are low for providing a hedge to illiquid systematic shocks: momentum profits are large when market liquidity witnesses acute illiquid shocks. Finally, the contemporaneous impact of shocks to market liquidity retains its significance even if we include the predictive variables proposed by Daniel and Moskowitz (2016) that capture time varying exposures of momentum returns to market risk.

The rest of the paper is organized such that section two describes data and construction of liquidity risk factors. In section three we provide background evidence and testable hypotheses. Section four summaries key results and section five is reserved for conclusions.

## 2. Data and construction of aggregate liquidity series

The data for the momentum strategy i.e. winners[4] (10th portfolio) minus losers[5] (1st portfolio) is taken from Ken French's online database. In order to develop measures for market liquidity, we obtain stock prices, returns, traded volume and number of shares outstanding from the Center for Research in Security Prices (CRSP). We download the daily and monthly files for all common stocks with share code 10 or 11 listed on NYSE, AMEX and NASDAQ or the period of July 1963- December 2012. We retain common stocks with a share price greater (lesser) than or equal to 5 (1000) USD and remove monthly stock prices and returns from our dataset if the stock does not have 15 daily return and volume data points in a month. In order to make our analysis robust the aggregate market liquidity is estimated in three different ways, as proposed in Fong, Holden and Trzcinka (2014) (FHT onwards), Lesmond, Ogden and Trzcinka (1999) (Zero-returns onwards) and Amihud (2002) (Price-impact onwards). For details on the construction of these measures please refer to the respective articles.

Approximations to market liquidity are highly persistent (Amihud, 2002). Sadka (2006) stresses the use of innovations to systematic liquidity factor, presumably for the fact that unexpected changes to the aggregate liquidity can better explain cross-sectional variations to expected returns than the predictable changes to the systematic liquidity. Therefore we examine the relationship between time varying market illiquidity and momentum returns using shocks to market illiquidity.[6] The shocks to each market illiquidity series are the part left unexplained after fitting an AR (2) filter. The shocks to market illiquidity are easily interpretable in terms of the increase and decrease in market liquidity: negative shocks to systematic illiquidity represent improvements in market liquidity and positive shocks to market illiquidity displays worsening of market liquidity for the very fact how increases in the level of the approximated aggregate liquidity series showcase market is becoming illiquid.[7]

This strategy will help us to decipher the reduction in momentum gains when observing negative shocks to systematic illiquidity from the increase in momentum profits when positive shocks to market illiquidity makes trading difficult. Nonetheless, the reported results in Section 4 are invariant to the use of market illiquidity or shocks to market illiquidity, a feature that is also noted in Avramov et al. (2015).[8] Furthermore, our work studies the time series variations in the momentum returns with respect to contemporaneous changes to market liquidity and contrasts with the cross-sectional pricing of liquidity risk widely reported in the literature e.g. Pastor and Stambaugh (2003), Sadka (2006) and Asness, Moskowitz and Pedersen (2013) among others.[9]

[3] We use shocks to market (il) liquidity and shocks to systematic (il) liquidity interchangeably to imply the same effect.

[4] Winners' portfolio is the 10th portfolio which is the collection of 13th month's returns for 10 percent of total stocks whose returns are the highest for the previous 11 months.

[5] Losers' portfolio is the 1st portfolio which is the collection of 13th month's returns for 10 percent of total stocks whose returns are the minimum for the previous 11 months.

[6] Haga (2015) has tested the relationship between momentum profits and credit risk.

[7] Sadka (2006 p-321) has given an alternate interpretations to shocks to systematic liquidity: he converted the measure of market illiquidity to a measure of liquidity by multiplying with minus one. For readers interested in drawing a relationship between shocks in market illiquidity and liquidity risk the Section 2.1 is recommended.

[8] See footnote 4 in their study: the negative relationship between momentum returns and an alternative measure – which captures innovations in aggregate market liquidity – persists.

[9] We are appreciative of the comprehensive nature of comments provided by an anonymous referee for the clarity of description to show to which strand of literature our evidence is related to and in suggesting a robustness check of our main results which is reported in the Section 4.4.