# Do Hedge Funds Supply or Demand Immediacy?

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First version in SSRN: June 2010
Current updated version: January, 2011

**Abstract**

In this paper, we study whether hedge funds supply or demand immediacy on NYSE and Amex traded stocks. Regressing hedge fund returns on a measure of the returns from providing immediacy we find that hedge funds typically (equity market neutral, event driven and long/short equity funds in particular) supply immediacy in the stock market. Consistent with recent theoretical research, we find that the amount of speculative capital (assets under management in hedge funds and the availability of funding liquidity to hedge funds) affects negatively the returns from providing immediacy, and that increases in the amount of speculative capital improve market liquidity and reduce stock return volatility. In recent years, following the introduction of the Autoquote system at NYSE in 2003, hedge funds role as suppliers of immediacy has decreased.

**Key words:** Hedge Funds, Speculative Capital, Liquidity, Immediacy, Volatility

**JEL Classifications:** G12, G23

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# Introduction

In this paper, we study whether hedge funds supply or demand immediacy on NYSE and Amex traded stocks. Regressing hedge funds' returns on a measure of the returns from providing immediacy we find that hedge funds typically supply immediacy in the stock market. Cross-sectional differences exist, however, and while equity market neutral, event driven and long/short equity hedge funds typically supply immediacy, for instance fixed-income arbitrage funds (that engage in capital structure arbitrage) on average demand immediacy in the stock market. Consistent with the theories presented in Brunnermeier and Pedersen (2009) and Gromb and Vayanos (2010), we find that the amount of speculative capital (assets under management in hedge funds and the availability of funding liquidity to hedge funds) affects negatively the returns from providing immediacy, and that increases in the amount of speculative capital improve market liquidity and reduce stock return volatility. In recent years, following the introduction of the Autoquote system at NYSE in 2003, hedge funds role as suppliers of immediacy has decreased.

Academic research has documented significant stock return reversals at one-week and one-month horizons (See, e.g., Jegadeesh, 1990, and Lehmann, 1990). Finance literature, see e.g., Grossman and Miller (1988) and Jegadeesh and Titman (1993), links the short-term return reversals with imperfect liquidity in financial markets. In illiquid markets, short-term return reversals emerge from transitory investors' portfolio imbalances, due to imperfect risk bearing ability of market makers. For instance, when an investor with an urgent need to sell a given stock arrives to the market, the stock price must temporarily decline below its fundamental value to induce market makers to provide immediacy, i.e., to become counterparties to the investor's trade and clear the market. Later, when new investors arrive to the market, prices revert back to fundamentals.

A statistical arbitrageur, a hedge fund, can also act as a market maker. Having estimated short-term return reversal patterns using past return data, observing recent past returns, he also can provide liquidity to the stock market by shorting the stocks with the lowest expected future returns (stocks that have recently appreciated in value) and by taking a long position in the stocks with the highest expected future returns (stocks that have recently declined). In this way he imperfectly provides immediacy to the market. Following this logic, we estimate such market makers' returns from providing immediacy. Our proxy for the returns from providing immediacy is the returns to a zero-investment long-short trading strategy that buys stocks in the quartile of stocks with the highest expected weekly excess returns, evaluated using past estimates of short-term return reversal, and

sells short stocks in the quartile of stocks with the lowest expected excess returns. The approach is similar to that in Rinne and Suominen (2010), who look at the costs of immediacy to mutual funds.

Using our time-series estimate of the returns from providing immediacy at NYSE and Amex, we then regress hedge fund returns on the returns from providing immediacy, and controls, in order to see whether hedge funds on average, and fund by fund, supply or demand immediacy in the stock market.

Previous academic research by Sadka (2010) finds that hedge funds are exposed to unexpected changes in market wide liquidity. The exposure that Sadka (2010) documents may come from hedge funds' portfolio allocations, where long positions are commonly taken in more illiquid securities than short positions. As an example, he refers to the case of convertible arbitrage, where long positions are taken in illiquid convertible bonds, while short positions are taken in more liquid stocks. Second, however, he points out that hedge funds' exposure to market wide liquidity changes could come from the use of trading strategies that require immediacy due to their frequent trading interval, such as momentum-strategy. In all our tests of whether hedge funds supply or demand immediacy we include also the unexpected shocks to liquidity, as measured in Sadka (2010), as a control. It turns out that the two phenomena co-exist: several hedge funds, or strategies as aggregate, have significant positive or negative exposure to the returns from providing immediacy. In addition several hedge funds, and strategies as aggregate, have significant exposure to unexpected changes in liquidity.

In addition to Sadka (2010), there are a few other papers that present evidence of hedge funds' exposure to the level of liquidity. For instance, Getmansky, Lo, and Makarov (2004) explore reasons for high autocorrelation in hedge fund returns and argue that exposure to illiquid securities is one likely explanation. Also Boyson, Stahel, and Stulz (2010) show evidence that liquidity shocks are the main drivers of hedge fund returns and that liquidity affects the probability of contagion in hedge funds. Gibson and Wang (2010), in turn, show that hedge funds' return predictability (documented by e.g. Avramov, Kosowski, Naik and Teo, 2007) is, at least partially, driven by the funds' exposure to liquidity risk. Other papers in this stream of literature include Aragon (2007), Liang and Park (2008), Khandani and Lo (2009) and Cao, Chen, Liang, and Lo (2009).

Our approach of looking at the hedge funds' exposure to the returns from providing immediacy is different from the approaches taken in all the above mentioned papers. The only other paper that focuses on the hedge fund's role in supplying immediacy is, to our knowledge, Aragon and Strahan (2009). They show evidence that following Lehman Brothers' bankruptcy, stocks traded by the Lehman-connected hedge funds experienced greater declines in market liquidity than other stocks.[1]

Our result that the returns from supplying immediacy were high for a prolonged period of time, but have declined since, is in line with Duffie (2010), who argues that capital accumulation to compete away profitable trading opportunities may take a long time. According to our results, it took several decades before hedge funds' assets under management reached levels where the abnormal high returns from supplying immediacy were competed away.

The rest of the paper is organized as follows. In Section 1 we describe how we measure the returns from providing immediacy. In section 2 we discuss the measurement of liquidity shocks. In Section 3 we present our main empirical results, while in Section 4 we study the effect of algorithmic trading on hedge funds' decision to supply immediacy. Section 5 concludes the paper.

# 1. Measuring the returns from providing immediacy

## 1.1. Measuring mean reversion in short-term excess returns

When estimating the expected future short-term returns we follow Rinne and Suominen (2010), and perform for each day a Fama-Macbeth (1973) type of cross-sectional regression, in which we regress the stocks' (indexed by *i*) next *5*-days' excess returns following the close on day *t*, $R_{i,t+5}$, on each of the stocks' past 5 days' excess returns, $R_{i,t-\tau}$, where $\tau \in \{1,..5\}$,

$$R_{i,t+5} = \alpha_t + \sum_{\tau=1}^{5} \beta_{t-\tau} R_{i,t-\tau} + \varepsilon_{i,t} \,. \qquad (1)$$

Here $\alpha_t$ is the intercept in the regression, while $\varepsilon_{i,t}$ is a stock specific error term. The first past excess return $R_{i,t-1}$ on the right hand side of regression (1) is the return from the close on day *t*-2

[1] Recent working paper by Kang, Kondor and Sadka (2011) is also related. They look at the effect of hedge fund activity on idiosyncratic volatility. One of their main findings is that the downward trend in the volatility of low idiosyncratic volatility stocks can be attributed to long/short equity hedge fund activity.

until the close on day *t*-1. This means that we do not include day *t*'s excess returns as an explanatory variable in the regression. The practice of skipping a day lowers our estimates of mean reversion, and our estimates of the returns from providing immediacy, but does not have a major qualitative impact on our results. This practice is common in the literature, and is done to eliminate noise and to make sure that our immediacy providing trading strategy is implementable.

One question in determining the expected mean reversion is the definition of the excess returns. In some papers that look at short-term return reversals, such as Lehmann (1990), Lo and MacKinlay (1990), Khandani and Lo (2007, 2008) and Nagel (2009) the excess returns are defined relative to an equal-weighted CRSP index. In Pastor and Stambaugh (2003) they are defined relative to the value weighted CRSP index. In this paper, as in Rinne and Suominen (2010), we define the excess returns relative to the corresponding equal-weighted Fama and French 48 industry index's return. Our results are qualitatively similar when using alternative definitions of excess returns.[2]

When performing the cross-sectional regressions (1), we included in our regressions every stock in NYSE and Amex with a 5-day return history, where we also observe 5-day future returns, that have not changed their Fama and French industry during the 10-day period. Our sample period for estimating mean reversion pattern runs from December 31, 1925 to the end of 2008. The estimated average coefficients $\hat{\beta}_{t-\tau}$ from regression (1) are all negative and statistically highly significant, showing that there is mean reversion in our data. Figure 1 shows the yearly averages of the coefficients from regression (1).

**[Insert Figure 1]**

## 1.2. Estimating the returns from providing immediacy

We assume that "statistical" market makers' (such as hedge funds') time *t* estimate of stocks' returns reversal pattern is based on 100 past days' cross sectional regressions of (1) up to time *t-6*, the last day for which there is data at time *t*. Now, combining his thus obtained estimate of the short-term return reversal pattern with the stocks' past five days' returns, such market maker obtains estimates of the stocks' future 5-days' expected excess returns. Our proxy for the market makers' returns from providing immediacy is the returns to a zero-investment long-short trading

[2] Another recent paper that also defines excess returns relative to industry indices is Hameed, Huang and Mian (2010).

strategy that buys all stocks in the quartile of stocks with the highest expected weekly excess returns and sells short all stocks in the quartile of stocks with the lowest expected weekly excess returns. We assume that the holding period for the market makers' long and short positions is always one week and the return on the market makers' immediacy providing trading strategy is the average return on all open positions.[3]

When estimating our proxy for the returns from providing immediacy, we make some additional data restrictions to reduce noise in our estimates. First, we remove from our sample all stocks that belong to the smallest decile of all US-incorporated common stocks listed on NYSE or Amex. Second, we eliminate penny stocks by removing from our sample all stocks that have a share price below five dollars. Next, we make two additional changes to the data restrictions to increase the implementability of our trading strategy. First, we drop the requirement that the stock has to have the same Fama and French industry during the five days after a trading day. Second, we require that the stock has to have a positive trading volume during each day when positions in this stock are opened.

Our estimate of the returns from providing immediacy is closely related to the estimates of the returns on contrarian strategies based on one day's return reversals, which have been presented in e.g. Khandani and Lo (2007 and 2008). The differences are that we use five past days' returns, instead of just one past day's returns to estimate expected future returns from providing immediacy. Second, we assume that market makers retain their position for the duration of one week as opposed to just one day. Third, we assume that market makers equally weight all stocks with high- or low-enough expected returns, instead of using the previous day's returns as portfolio weights. Finally we leave one day in between signals and trading to eliminate noise and to make sure that our strategy is implementable. We believe our approach results in a more applicable measure of the returns from providing immediacy, that can be used to analyze hedge funds' trading behavior, as it gives less weight to the most extreme cases and incorporates information from several as opposed to just one day.

Table 1 documents the returns on our immediacy providing trading strategy.[4]

[3] If stock has changed country of incorporation, the exchange or industry during the holding period, stock is held until the end of the holding period and trade is closed using a valid closing price. The returns of delisted stocks are based on delisting returns in CRSP and stocks' excess returns after delisting are assumed to be zero.
[4] A more comprehensive analysis of the returns from providing immediacy is presented in Rinne and Suominen (2010).

**[Insert Table 1]**

Figure 2 shows the time series evolution of the monthly returns from providing immediacy. As is evident from Figure 2, the returns from providing immediacy have decreased over time (as the degree of short-term return reversal in the stock market has decreased).

**[Insert Figure 2]**

We use this time-series of the returns from providing immediacy as the basis of our analysis of whether hedge funds demand or supply immediacy. To measure whether hedge funds supply or demand immediacy we simply regress hedge funds' returns on the returns from supplying immediacy. If the coefficient is statistically significantly positive for any given fund, we conclude that this hedge fund supplies immediacy. If the coefficient is statistically significantly negative, we conclude that the hedge fund demands immediacy.

It is not clear in advance whether hedge funds on average act as market makers and supply immediacy, or demand immediacy in the stock market. While there are large returns from providing immediacy, as documented above, many other profitable dynamic trading strategies employed by hedge funds, such as value and momentum trading, demand immediacy.

# 2. Liquidity Shocks

The picture regarding whether hedge funds' demand or supply immediacy is somewhat complicated by the finding in Sadka (2010) that hedge funds have exposure to unexpected shocks to the level of liquidity. This empirical finding can be understood by looking at some of the strategies that hedge funds employ. For instance, convertible arbitrage hedge funds are long illiquid convertibles and short liquid stocks, see e.g. Agarwal, Fung, Loon, and Naik (2007). Also in the stock market, hedge funds commonly take positions in illiquid small stocks while shorting the more liquid large stocks. Unexpected liquidity shocks that increase the liquidity premium affect adversely the returns to both of these long-short investment strategies. As liquidity and short-term reversals are closely related, see e.g. Amramov, Chordia and Goyal (2006), we must control for liquidity shocks in our regressions that aim to look at whether hedge funds supply or demand immediacy in the stock market.

As a measure of liquidity, we use the permanent-variable component of price impact constructed in Sadka (2006)[5]. We calculate the liquidity shocks as the residuals of an AR(3) model of changes in the level of liquidity. This approach of estimating liquidity shocks is identical to that in Sadka (2010). The correlation between liquidity shocks and the returns from providing immediacy is 0.003.

# 3. Do hedge funds supply or demand immediacy?

## 3.1. Data on hedge funds

The data on individual hedge funds are from the TASS database. Our sample includes all 5,436 hedge funds and funds of hedge funds in the TASS database that report their returns in U.S. dollars and have a minimum of 36 monthly return observations between January 1994 and December 2008. When analyzing the effect of the implementation of the automated quote dissemination in NYSE on hedge funds' decision to supply immediacy, we use a subsample of 1,265 funds that have at least 36 monthly return observations both before and after the gradual implementation that took place between January and May of 2003. Table 2 provides the basic summary statistics of variables used in this study.

**[Insert Table 2]**

## 3.2. Hedge funds' exposure to the returns from providing immediacy

We start our empirical analysis by examining whether hedge fund returns are dependent on the returns from providing immediacy. To test if the return from providing immediacy is significant in the presence of other factors, we regress the hedge fund returns on a number of previously used risk factors as well as the returns from providing immediacy variable described earlier. More precisely, we extend the seven hedge fund risk factor model of Fung and Hsieh (2004) by adding the returns from providing immediacy and the unexpected changes in liquidity to the model.[6] Table 3 presents the cross-sectional means of the coefficients of the returns from providing immediacy and liquidity

[5] Data for the Sadka (2006) liquidity factors is obtained from WRDS.

[6] The seven factors used by Fung and Hsieh (2004) are three trend following factors (for bonds, currencies and commodities; Fung and Hsieh, 2001), an equity market factor (S&P 500), a size spread factor (Russell 2000 minus S&P 500), a bond market factor (monthly change in the 10-year treasury constant maturity yield), and a credit spread factor (monthly change in the Moody's Baa yield minus 10-year treasury constant maturity yield). Data for the trend following factors are available on David Hsieh's website:
http://faculty.fuqua.duke.edu/~dah7/DataLibrary/TF-FAC.xls.

shock variables, together with the proportion of statistically significant negative and positive coefficients for the 12 fund categories in TASS database.

**[Insert Table 3]**

The average coefficient of the returns from providing immediacy in the hedge fund return regression is positive and statistically significant. This means that hedge funds, on average, supply immediacy in the stock market.

Cross-sectional differences within hedge funds do exist, however: 3.6% of the funds have a statistically significant negative coefficient to the returns from providing immediacy, whereas 6.2% have a significant positive coefficient. The proportion of positive coefficients is significantly larger than the expected 2.5% based on two-sided tests at a 1% significance level, but also the proportion of funds with negative coefficients is significantly larger than the expected 2.5% based on two-sided tests at a 5% significance level. These results indicate that although hedge funds, as an aggregate, have a positive exposure to the returns from providing immediacy, a significant proportion of the funds demand immediacy in the stock market.

Of the various fund categories, the coefficient for the returns from providing immediacy is significantly positive in three: equity market neutral, event driven, and long-short equity. These categories thus, on average, have the largest tendency to supply immediacy. The coefficient is significantly negative in two categories: fixed-income arbitrage and managed futures.

Cross-sectional differences exist also within fund categories. In all but three categories (fund of funds, global macro, and others) the proportion of positive coefficients (to the returns from providing immediacy) significantly exceeds the expected 2.5%. The number of negative coefficients significantly exceeds 2.5% in five out of twelve categories. In all but one of these five categories, however, also the number of positive coefficients exceeds 2.5%. Largest proportions of negative coefficients, i.e. the systematically most immediacy demanding funds, are found in dedicated short bias and fixed income arbitrage categories, whereas highest proportion of systematically immediacy providing funds (positive coefficients) are in equity market neutral and event driven categories. All in all, the results indicate that there are significant differences in immediacy supply and demand patterns across, and also within, hedge fund styles.

It is quite expected to see that many of the funds that supply immediacy at NYSE and Amex come from event driven, equity market neutral and long-short equity categories. The funds that demand immediacy are more evenly spread across all categories.

It may seem surprising that fixed-income arbitrage funds appear so significantly both as demanders and suppliers of immediacy in the stock market. One of the main strategies of fixed income arbitrage funds is, however, so called "capital structure arbitrage," where long and short positions in fixed income securities are hedged with balancing positions in the equity markets. Because of these equity linked strategies, at least, it is understandable that fixed income arbitrage funds act either as immediacy demanders or suppliers at NYSE and Amex. Our approach of estimating whether hedge funds demand or supply immediacy can however underestimate the overall role of fixed-income arbitrage funds in supplying immediacy. This is so because each of these funds may over time act in both roles, as immediacy demanders and as immediacy suppliers, depending on whether other investors at that time require more immediacy in the bond than in the equity markets. For instance, if the other investors' demand for immediacy comes from the bond markets, fixed income arbitrageurs may supply immediacy in the fixed income market and simultaneously act as immediacy demanders in the equity markets when setting up their hedges. Vice versa, if the ultimate demand for immediacy comes from the equity markets. Same is true also for the convertible arbitrage funds.[7] Given such problems in detecting the full extent to which funds are involved in supplying immediacy, our finding that so many funds have systematically statistically significant positive exposure to the returns from supplying immediacy is clear evidence that supply of immediacy is an important strategy for hedge funds.

As Sadka (2010), we also find that hedge funds, on average, have a significant positive exposure to unexpected liquidity shocks beyond their exposures to the returns from providing immediacy. As discussed earlier, many hedge fund strategies have exposure to the illiquidity premium as they involve long positions in illiquid securities and short positions in liquid securities. In addition, as several recent papers argue, see e.g. Nagel (2009), liquidity is closely related with the level of price volatility. Prior research, see Agarwal and Naik (2004), has shown that many hedge fund trading strategies, for instance many event driven strategies, have payoff profiles that resemble written put options. These types of strategies therefore suffer from increases in volatility, which explains the

[7] See Agarwal, Fung, Loon, and Naik (2007) for related evidence on how convertible arbitrage hedge funds trade in the convertible bond and equity markets.

large exposure of event driven funds to liquidity shocks. One more example of a hedge fund strategy that suffers from unexpected decreases in liquidity is volatility selling strategy, where hedge funds issue financial options.

## 3.3. Speculative capital and the returns from providing immediacy

An increase in the amount of capital allocated to funds that provide immediacy should decrease the returns available from such activity. To test this, we regress the returns from providing immediacy on two measures of hedge fund industry capital (hedge fund industry equity and a proxy for hedge fund industry funding capital, i.e., total borrowing). First, our proxy for the hedge funds industry equity is the total hedge fund industry assets under management (AUM).[8] We divide the hedge fund industry's dollar AUM by the market capitalization of the U.S. equity market to get a relative measure of hedge fund equity. Second, we need a proxy for the total funding capital that hedge fund industry employs. To build such a proxy, we first use the difference between the three month Eurodollar and the three month Treasury interest rates, i.e. TED spread, as a measure of funding cost. High TED spread indicates high cost of funding and low leverage. The total amount borrowed by hedge funds depends not only on the cost of leverage but also their equity. Hence, we multiply TED spread by the hedge fund industry AUM (again, normalized by the market capitalization of the US equity market) to obtain a measure of hedge fund industry's cost of leverage, a variable that proxies for the amount borrowed by hedge funds (relative to the US equity market). Table 4 reports the results of regressing monthly returns from providing immediacy on lagged hedge fund industry AUM and lagged measure of the cost of leverage, i.e., lagged product of TED spread with the industry AUM.

**[Insert Table 4]**

The coefficient of the hedge fund AUM is negative and statistically significant implying that higher hedge fund equity capital leads to lower returns from providing immediacy. The cost of leverage, in turn, has a significantly positive coefficient indicating that lower amount of funding capital (higher funding cost) increases the returns from providing immediacy. Together these results show that more capital involved in providing immediacy leads to lower returns from that activity. We repeat the regression including the Fama and French (1993) risk factors and a longer sample of data starting from January 1979. The results remain quantitatively and qualitatively unchanged.

[8] Our estimates for hedge fund industry's AUM and hedge fund flows are from Jylhä and Suominen (2011).

An alternative method to examine the relationship between speculative capital and the returns from providing immediacy is to study the effect of speculative capital on the expected, instead of the realized, returns from providing immediacy. As before, we obtain a time-varying measure of the expected mean reversion in stocks' excess returns at time *t* from the past hundred days' beta estimates from the daily cross sectional regressions (1) up to time *t-6* (the last day for which sufficient data to run the regression exists). Combining these time-varying estimates of five-day mean reversion with the stocks' past five days' excess returns, we obtain daily stock specific estimates of future 5-day excess returns. Our measure of the expected returns from providing immediacy (a measure of the expected costs of immediacy to other traders) is obtained by calculating monthly averages of the daily expected returns on 5-day long/short portfolios that are long (an equal-weighted amount) in all stocks in the quartile of stocks with the highest expected excess returns and short (an equal-weighted amount) in the quartile of stocks with the lowest expected excess returns. In Table 5, we present results from regressing changes in the expected returns from providing immediacy on measures of changes in speculative capital, i.e. hedge fund (industry) flows and changes in the cost of leverage (product of TED spread and the AUM).

**[Insert Table 5]**

The results presented in Table 5 are in line with the findings presented in Table 4: The flow of funds to hedge funds decreases the expected returns from providing immediacy.

## 3.4. Speculative capital and liquidity

In Table 6 we report the results from regressing changes in the level of liquidity on hedge fund flows, changes in the cost of leverage, and controls. As controls we use the one month lagged stock market return and a dummy variable for NBER recessions as previous research suggests that these are important factors affecting liquidity, see Hameed, Kang, and Viswanathan (2009) and Næs, Skjeltorp, and Ødegaard (2010). The results show that hedge fund flows, and the changes in funding capital have a statistically significant effect on changes in the level of liquidity. This means that speculative capital and availability of funding liquidity affect liquidity in the stock market, as predicted by Brunnermeier and Pedersen (2010) and Gromb and Vayanos (2010).

**[Insert Table 6]**

### 3.5. Speculative capital and volatility

Several papers, such as Brunnermeier and Pedersen (2009), Nagel (2009) and Suominen and Rinne (2010), link volatility with the level of liquidity.

In Table 7 we report the results from regressing changes in the average level of stock return volatility on proxies for changes in speculative capital. Again, the proxy for the change in hedge fund equity is the hedge fund industry flow and the proxy for change in cost of leverage is the change in Treasury to Eurodollar spread times AUM. We also include lagged return to immediacy provision as a proxy for the amount of capital committed to providing immediacy assuming that following high returns more capital is committed to providing immediacy.[9,10]

**[Insert Table 7]**

We would expect that hedge fund flows and and past returns from providing immediacy have a negative effect and the changes in cost of leverage have a positive effect on changes volatility. The effect of hedge fund flows is not statistically significant, but has the correct sign. The effects of past returns from providing immediacy and cost of leverage have both correct sign and are highly statistically significant. This result confirms the idea that availability of speculative capital affects stock market volatility.[11]

# 4. Effect of algorithmic trading in the supply of immediacy

In this section we study the effect of algorithmic trading on hedge funds' decision to supply or demand immediacy, by examining regression coefficients to the returns from supplying immediacy before and after the introduction of the Autoquote system at NYSE. In 2003 NYSE introduced automated quote dissemination system, which increased algorithmic trading and improved liquidity (Hendershott, Jones and Menkveld, 2009). Brogaard (2010), in turn, presents evidence that the

[9] The idea here is similar to that in Greenwood and Vayanos (2010) who measure change in arbitrageurs' wealth as a product of yield curve slope and bond returns and find this variable to forecast future bond returns.
[10] We also include this variable in the regressions presented in Tables 4 and 6. However, its effect on the returns from providing immediacy and the change in the level of liquidity are not statistically significant and we present those results without the lagged return from providing immediacy.
[11] Kang, Kondor and Sadka (2011) present complementary evidence that hedge fund activity affects idiosyncratic volatility.

various types of institutions involved in algorithmic trading engage in reversal trades and thus supply immediacy to the stock market.

If the level of liquidity, and the increased competition from algorithmic traders in the supply of immediacy affect hedge funds' decision to supply immediacy, we should expect the coefficient of the returns from providing immediacy to be smaller in a hedge fund return regression following the introduction of the Autoquote system than before it.

To study the difference in the returns from providing immediacy coefficients before and after the automation of quote dissemination, we extend our baseline regression by interacting returns from providing immediacy and liquidity shocks with two indicator variables: one for months during the automation process (February through May 2003) and the other for months after the automation was completed. To estimate this regression, we use a sub-sample of data that covers the period three years before and after the automation of quote dissemination, i.e. February 2000 through May 2006. To alleviate any potential bias arising from changes in the hedge fund industry composition during the period, we only use data on those 1,265 funds that have full return history for the 76 month sub-period. Table 8 presents the cross-sectional averages of the coefficient of the returns from providing immediacy and liquidity shocks as well as the proportion of negative and positive coefficients before and after the automation.

**[Insert Table 8]**

Hedge funds' seven categories significantly decrease their average exposure to the returns from providing immediacy after the implementation of Autoquote. Also, the average coefficient of the returns from providing immediacy is very significantly negative after the automation whereas the pre-Autoquote average coefficient is very significantly positive. The overall proportion of immediacy demanding funds increases from 1.0% to 3.7% while the proportion of immediacy providing funds decreases from 9.3% to 1.3%. These results imply that as market liquidity improves, and the competition in the supply of immediacy increases from other types of institutions, many hedge funds decrease their supply of and increase their demand for immediacy. Finally, we note that (not reported) the hedge funds exposure to liquidity shocks was largely unaffected by the introduction of the Autoquote system. [12]

[12] These findings are consistent with the idea that in recent years only the largest and most efficient players (hedge funds, but also other types of institutions) have been supplying immediacy in the stock market.

# 5. Conclusion

In this paper we look at whether hedge funds demand or supply immediacy in the stock market. Our main finding is that typically hedge funds supply immediacy in the stock market. We find support for the theories set forth in Brunnermeier and Pedersen (2009) and Gromb and Vayanos (2010) that link market liquidity with the availability of funding liquidity to arbitrageurs and the availability of intermediary capital. In particular, we show that the returns from providing immediacy decrease in the amount of speculative capital (hedge funds' assets under management and the amount of funding credit). In addition, increases in the amount of speculative capital improve liquidity and decrease stock return volatility. Finally, our results support the theories of slow moving capital as presented in Duffie (2010). Our evidence suggests that it took several decades before hedge funds obtained sufficient speculative capital to compete away the excess returns from providing immediacy.

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**Table 1: Return statistics for the immediacy providing trading strategy.**

This table shows the statistics of daily and monthly returns from providing immediacy. Sample period is from 1926 through 2008. The returns are calculated for a portfolio that has a long position in the quartile of stocks with the highest expected weekly excess returns and a short position in the quartile of stocks with the lowest expected weekly excess returns. Expected excess returns are calculated using 100 day moving averages of coefficients for mean reversion, until six days prior to taking positions, and each day stocks are ranked into quartiles based on their 5-day expected excess returns. Return statistics are based on averages of the returns of all open positions. There is no consideration for transaction costs.

| | Daily | Monthly |
|---|---|---|
| Mean | 0.13 | 2.85 |
| 25th percentile | -0.04 | 1.49 |
| Median | 0.11 | 2.48 |
| 75th percentile | 0.27 | 3.99 |
| St.dev. | 0.42 | 2.32 |
| Positive return % | 68.6% | 93.1% |
| Sharpe ratio | 0.30 | 1.23 |
| 4-factor alpha | 0.11 | 2.69 |
| t-statistics for alpha | (28.38) | (21.31) |

**Table 2. Descriptive statistics.**

This table presents the descriptive statistics of the variables used in the paper. The sample period is from January 1994 through December 2008. All data are on a monthly frequency.

| | Mean | St.dev. | 25% | Median | 75% | Funds | Obs. |
|---|---|---|---|---|---|---|---|
| **PANEL A: Factors** | | | | | | | |
| Bond trend | -0.80 | 14.89 | -10.55 | -3.70 | 5.16 | | 180 |
| Currency trend | 0.85 | 19.91 | -13.05 | -2.82 | 9.47 | | 180 |
| Commodity trend | 0.20 | 14.03 | -9.32 | -2.51 | 6.79 | | 180 |
| Equity market | 0.46 | 4.32 | -2.01 | 1.09 | 3.31 | | 180 |
| Size spread | 0.02 | 3.59 | -2.43 | -0.01 | 2.28 | | 180 |
| Bond market | -1.99 | 27.91 | -21.25 | -2.00 | 16.00 | | 180 |
| Credit spread | 2.16 | 20.24 | -8.00 | 0.50 | 8.00 | | 180 |
| Return from providing immediacy | 1.11 | 1.72 | 0.04 | 1.06 | 2.01 | | 180 |
| Liquidity shock (×1000) | 0.00 | 5.85 | -2.68 | 0.22 | 2.53 | | 180 |
| **PANEL B: Hedge fund return, full sample** | | | | | | | |
| All funds | 0.77 | 14.38 | -0.69 | 0.71 | 2.13 | 5,436 | 448,037 |
| **PANEL C: Hedge fund return, by style** | | | | | | | |
| Convertible Arbitrage | 0.56 | 3.26 | -0.08 | 0.73 | 1.50 | 166 | 14,676 |
| Dedicated Short Bias | 0.24 | 7.16 | -3.02 | 0.12 | 3.10 | 32 | 2,909 |
| Emerging Markets | 0.94 | 7.65 | -1.58 | 1.01 | 3.66 | 326 | 27,367 |
| Equity Market Neutral | 0.62 | 3.00 | -0.36 | 0.59 | 1.63 | 269 | 19,984 |
| Event Driven | 0.79 | 3.55 | -0.05 | 0.80 | 1.78 | 472 | 40,683 |
| Fixed Income Arbitrage | 0.54 | 3.12 | 0.09 | 0.71 | 1.37 | 230 | 17,685 |
| Fund of Funds | 0.50 | 2.98 | -0.41 | 0.63 | 1.61 | 1,263 | 106,796 |
| Global Macro | 0.76 | 4.92 | -1.10 | 0.58 | 2.48 | 248 | 18,501 |
| Long/Short Equity | 0.98 | 24.88 | -1.15 | 0.80 | 2.90 | 1,655 | 134,269 |
| Managed Futures | 1.03 | 11.84 | -2.10 | 0.59 | 3.63 | 406 | 35,308 |
| Multi-Strategy | 0.68 | 3.76 | -0.31 | 0.74 | 1.80 | 353 | 28,832 |
| Others | 0.68 | 4.01 | 0.31 | 0.98 | 2.05 | 16 | 1,027 |
| **PANEL D: Hedge fund return, by period** | | | | | | | |
| 1994-1996 | 1.19 | 5.23 | -0.67 | 1.01 | 2.73 | 1,346 | 34,832 |
| 1997-1999 | 1.35 | 6.76 | -0.75 | 1.05 | 3.28 | 2,297 | 62,533 |
| 2000-2002 | 0.54 | 5.28 | -0.99 | 0.54 | 1.96 | 3,459 | 91,691 |
| 2003-2005 | 0.98 | 5.99 | -0.28 | 0.73 | 1.92 | 4,735 | 132,114 |
| 2006-2008 | 0.31 | 25.34 | -1.06 | 0.62 | 1.93 | 4,137 | 126,867 |

**Table 3. Hedge funds' exposure to the returns from providing immediacy.**

This table presents summary statistics of the coefficients of the "returns from providing immediacy" from regressions of hedge fund returns on the seven Fung and Hsieh (2001) risk factors, returns from providing immediacy and unexpected change in the level of liquidity. *Mean* gives the average of the coefficients for each hedge fund category, *Negative* (*Positive*) gives the proportion of coefficients that are significantly negative (positive) at a 5% level using autocorrelation and heteroskedasticity consistent standard errors (Newey and West, 1987) and *Funds* gives the number of hedge funds in the category. For means, the *t*-statistics for the test of zero mean are given in parenthesis. For the proportion of negatives and positives, the figures in parenthesis are *z*-statistics testing whether the proportion is equal to 2.5% which it would be under no exposure to provision of immediacy. Figures significant at a 5% level are bolded.

| | Coefficient of returns from providing immediacy | | | Coefficient of liquidity shocks | | | |
|---|---|---|---|---|---|---|---|
| | Mean | Negative | Positive | Mean | Negative | Positive | Funds |
| CA | 0.015 | 4.2% | **7.8%** | **0.336** | **0.0%** | **16.9%** | 166 |
| | (0.60) | (1.42) | (4.40) | (5.81) | (-2.06) | (11.86) | |
| DSB | -0.077 | **12.5%** | **9.4%** | **-0.471** | 3.1% | 0.0% | 32 |
| | (-0.75) | (3.62) | (2.49) | (-2.31) | (0.23) | (-0.91) | |
| EM | 0.049 | 3.4% | **5.2%** | **0.492** | 1.8% | **7.4%** | 326 |
| | (1.23) | (1.01) | (3.14) | (4.57) | (-0.76) | (5.62) | |
| EMN | **0.039** | **4.5%** | **11.9%** | **0.250** | 1.9% | **13.0%** | 269 |
| | (2.03) | (2.06) | (9.87) | (3.98) | (-0.67) | (11.04) | |
| ED | **0.103** | 1.7% | **11.4%** | **0.327** | **0.6%** | **15.0%** | 472 |
| | (6.19) | (-1.12) | (12.44) | (8.22) | (-2.59) | (17.45) | |
| FIA | **-0.064** | **7.8%** | **5.2%** | 0.096 | 2.2% | **5.7%** | 230 |
| | (-3.06) | (5.17) | (2.64) | (1.73) | (-0.32) | (3.06) | |
| FoF | -0.006 | 2.1% | 2.1% | **0.357** | **0.6%** | **6.8%** | 1,263 |
| | (-0.95) | (-1.00) | (-0.82) | (21.06) | (-4.43) | (9.81) | |
| GM | -0.058 | **6.0%** | 3.2% | **0.237** | 3.6% | **4.8%** | 248 |
| | (-1.30) | (3.58) | (0.73) | (3.01) | (1.14) | (2.36) | |
| LSE | **0.046** | **4.1%** | **7.6%** | 1.013 | 2.1% | **7.9%** | 1,655 |
| | (3.48) | (4.19) | (13.17) | (1.38) | (-1.16) | (14.11) | |
| MF | **-0.080** | 3.2% | **5.2%** | **0.522** | 2.5% | **6.7%** | 406 |
| | (-2.47) | (0.91) | (3.45) | (5.74) | (-0.05) | (5.36) | |
| MS | 0.022 | 3.7% | **6.2%** | **0.239** | 1.4% | **6.2%** | 353 |
| | (1.28) | (1.42) | (4.49) | (3.66) | (-1.30) | (4.49) | |
| O | 0.017 | 0.0% | 6.3% | -0.048 | 0.0% | 0.0% | 16 |
| | (0.15) | (-0.64) | (0.96) | (-0.29) | (-0.64) | (-0.64) | |
| All | **0.017** | **3.6%** | **6.2%** | **0.538** | **1.6%** | **8.3%** | 5,436 |
| | (2.63) | (5.13) | (17.30) | (2.40) | (-4.42) | (27.20) | |

The hedge fund categories are: convertible arbitrage (CA), dedicated short bias (DSB), emerging markets (EM), equity market neutral (EMN), event driven (ED), fixed income arbitrage (FIA), fund of funds (FoF), global macro (GM), long/short equity (LSE), managed futures (MF), multi-strategy (MS), and others (O).

**Table 4. Speculative capital and the returns from providing immediacy.**

This table presents the results of regressing the monthly returns from providing immediacy on measures of speculative capital. *Return from providing immediacy* is the return on a long/short portfolio where five day long (short) positions are taken each day in the quartile of stocks with highest (lowest) expected five day return. *Hedge fund AUM* is the lagged total assets under management (AUM) in the hedge fund industry divided by the market capitalization of the U.S. equity market. *Cost of leverage* is calculated as the lagged difference between the three month Eurodollar and the three month Treasury interest rates, multiplied by the hedge fund AUM relative to stock market capitalization. *Mkt-rf*, *SMB*, and *HML* are the Fama and French (1993) risk factors. Columns (1) and (2) present results for the period from 1/1994 to 12/2008, the sample period in all tests involving individual hedge fund data, and columns (3) and (4) present the results for the full sample period 1/1979 to 12/2008, for which the data on hedge fund AUM exists. Autocorrelation and heteroscedasticity consistent *t*-statistics are reported in parenthesis. Coefficients significant at a 5% level are bolded.

| | | 1994 - 2008 | | 1979 - 2008 |
|---|---|---|---|---|
| Return from providing immediacy | (1) | (2) | (3) | (4) |
| Intercept | **0.028** | **0.028** | **0.033** | **0.032** |
| | (8.26) | (8.47) | (19.65) | (19.15) |
| Hedge fund AUM | **-0.430** | **-0.423** | **-0.537** | **-0.542** |
| | (-6.24) | (-6.10) | (-13.00) | (-12.94) |
| Cost of leverage | **0.116** | **0.125** | **0.149** | **0.167** |
| | (4.21) | (3.35) | (7.30) | (6.28) |
| Mkt-rf | | 0.077 | | **0.070** |
| | | (1.85) | | (2.42) |
| SMB | | -0.068 | | 0.027 |
| | | (-1.57) | | (0.63) |
| HML | | -0.045 | | 0.043 |
| | | (-0.89) | | (1.01) |
| Adjusted $R^2$ | 0.189 | 0.237 | 0.318 | 0.334 |
| Monthly observations | 180 | 180 | 360 | 360 |

**Table 5. Speculative capital and the expected returns from providing immediacy.**

This table presents the results of regressing the monthly change in the expected returns from providing immediacy on measures of changes in speculative capital. *Expected return* is the expected return to our immediacy providing trading strategy in a given month. *Hedge fund flow* is the net flow of capital into the hedge fund industry divided by the market capitalization of the U.S. equity market. *Change in cost of leverage* is calculated as the change in the difference between the three month Eurodollar and the three month Treasury interest rates, multiplied by the lagged hedge fund AUM relative to stock market capitalization. Lagged level of expected return is included as a control. Column (1) presents results for the period from 1/1994 to 12/2008, the sample period in all tests involving individual hedge fund data, and column (2) for the full sample period 1/1979 to 12/2008, for which the data on hedge fund AUM exists. Autocorrelation and heteroscedasticity consistent *t*-statistics are reported in parenthesis. Coefficients significant at a 5% level are bolded.

| | 1994 - 2008 | 1979 - 2008 |
|---|---|---|
| Change in expected return | (1) | (2) |
| Intercept | **0.001** | **0.001** |
| | (3.53) | (3.60) |
| Hedge fund flow[1] | **-0.676** | **-0.548** |
| | (-3.69) | (-3.33) |
| Change in cost of leverage | -0.001 | -0.002 |
| | (-1.05) | (-1.26) |
| Expected return (*t*-1) | **-0.195** | **-0.114** |
| | (-3.34) | (-3.63) |
| Adjusted $R^2$ | 0.311 | 0.195 |
| Monthly observations | 180 | 180 |

[1] Coefficients of hedge fund flow are divided by $10^9$.

**Table 6. Speculative capital and level of liquidity.**

This table presents the results of regressing the monthly change in the level of liquidity on measures of changes in speculative capital. As a measure of liquidity, we use the permanent-variable component of price impact constructed in Sadka (2006). *Hedge fund flow* is the net flow of capital into the hedge fund industry divided by the market capitalization of the U.S. equity market. *Change in cost of leverage* is calculated as the change in the difference between the three month Eurodollar and the three month Treasury interest rates, multiplied by the lagged hedge fund AUM relative to stock market capitalization. Lagged level of liquidity, past month's U.S. equity market return, and a dummy variable indicating NBER recessions are included as controls. Column (1) presents results for the period from 1/1994 to 12/2008, the sample period in all tests involving individual hedge fund data, and column (2) for the full sample period 1/1979 to 12/2008, for which the data on hedge fund AUM exists. Autocorrelation and heteroscedasticity consistent *t*-statistics are reported in parenthesis. Coefficients significant at a 5% level are bolded.

| | 1994 - 2008 | 1983 - 2008 |
|---|---|---|
| Δ Liquidity | (1) | (2) |
| Intercept | 0.000 | -0.001 |
| | (-0.62) | (-1.57) |
| Hedge fund flow[1] | 1.142 | **1.373** |
| | (1.66) | (2.42) |
| Change in cost of leverage | **-0.068** | **-0.067** |
| | (-9.01) | (-8.99) |
| Liquidity (*t*-1) | **-0.944** | **-1.061** |
| | (-5.58) | (-11.61) |
| Market return (*t*-1) | **0.031** | **0.026** |
| | (3.73) | (3.71) |
| Recession | 0.000 | -0.001 |
| | (-0.11) | (-0.63) |
| Adjusted $R^2$ | 0.563 | 0.558 |
| Monthly observations | 180 | 308 |

[1] Coefficients of hedge fund flow are divided by $10^9$.

**Table 7. Speculative capital and volatility.**

This table presents the results of regressing the monthly change in stock return volatility on measures of changes in speculative capital. *Volatility* is measured as an equal weighted average of standard deviations of individual stocks' daily returns. *Hedge fund flow* is the net flow of capital into the hedge fund industry divided by the market capitalization of the U.S. equity market. *Returns from providing Immediacy* is the one month lagged return to the immediacy provision strategy. *Change in cost of leverage* is the change in the difference between the three month Eurodollar and the three month Treasury interest rates, multiplied by the lagged hedge fund AUM relative to stock market capitalization. Column (1) presents results for the period from 1/1994 to 12/2008 and column (2) for 1/1979 to 12/2008. Autocorrelation and heteroscedasticity consistent *t*-statistics are reported in parenthesis. Coefficients significant at a 5% level are bolded.

| | 1994 - 2008 | 1979 - 2008 |
|---|---|---|
| Δ Volatility | (1) | (2) |
| Intercept | **0.002** | **0.002** |
| | (3.86) | (4.99) |
| Hedge fund flow ($t$)[1] | -0.507 | -0.684 |
| | (-0.87) | (-1.40) |
| Hedge fund flow ($t$-1)[1] | -0.812 | -0.525 |
| | (-1.37) | (-1.02) |
| Change in cost of leverage ($t$) | **0.042** | **0.044** |
| | (12.45) | (10.26) |
| Change in cost of leverage ($t$-1) | **0.047** | **0.046** |
| | (4.00) | (3.46) |
| Return from providing immediacy ($t$-1) | **-0.094** | **-0.063** |
| | (-4.23) | (-5.27) |
| Adjusted $R^2$ | 0.359 | 0.211 |
| Monthly observations | 180 | 360 |

[1] Coefficients of hedge fund flows are divided by $10^9$.

**Table 8. Autoquote and provision of immediacy**.

This table presents summary statistics for the coefficients of the returns from providing immediacy in a regression of hedge fund returns on the seven Fung and Hsieh (2001) risk factors and returns from providing immediacy before and after the implementation of the Autoquote system in NYSE. *Mean* gives the average of the coefficients for each hedge fund category, *Negative* (*Positive*) gives the proportion of coefficients that are significantly negative (positive) at a 5% level using autocorrelation and heteroskedasticity consistent standard errors (Newey and West, 1987) and *Funds* gives the number of hedge funds in the category. *Before* gives the figures for the 3-year period preceding the implementation (2/2000 – 1/2003) and *After* gives the figure for the 3-year period following the implementation (6/2003 – 5/2006). *Diff.* gives the change in the figures (*After – Before)*. Only those funds that have a complete return history for the period 2/2000 through 5/2006 are included. For means, the *t*-statistics for the test of zero mean are given in parenthesis. For the proportion of negatives and positives, the figures in parenthesis are *z*-statistics testing whether the proportion is equal to 2.5% which it would be under no exposure to provision of immediacy. For changes in the proportion of negative and positive coefficients, the figures in parenthesis are *z*-statistics testing whether the proportions are equal before and after the implementation of Autoquote. "Others" category is excluded as it contains only a single observation. Figures significant at a 5% level are bolded.

| **Coefficient of returns from providing immediacy** | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Mean coefficient | | | Negative | | | Positive | | | |
| | Before | After | Diff. | Before | After | Diff. | Before | After | Diff. | Funds |
| CA | **0.072** | 0.054 | -0.018 | 0.0% | 2.3% | 2.3% | 2.3% | 0.0% | -2.3% | 43 |
| | (2.74) | (1.91) | (-0.57) | (-1.05) | (-0.07) | (1.01) | (-0.07) | (-1.05) | (-1.01) | |
| DSB | **0.569** | -0.307 | **-0.876** | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 11 |
| | (2.31) | (-1.55) | (-2.54) | (-0.53) | (-0.53) | (0.00) | (-0.53) | (-0.53) | (0.00) | |
| EM | 0.041 | -0.093 | -0.134 | 0.0% | 2.2% | 2.2% | **6.5%** | 0.0% | **-6.5%** | 92 |
| | (0.52) | (-1.25) | (-1.30) | (-1.54) | (-0.20) | (1.42) | (2.47) | (-1.54) | (-2.49) | |
| EMN | **0.190** | **-0.144** | **-0.334** | 0.0% | **8.9%** | **8.9%** | **24.4%** | 2.2% | **-22.2%** | 45 |
| | (2.73) | (-3.14) | (-4.35) | (-1.07) | (2.75) | (2.05) | (9.43) | (-0.12) | (-3.10) | |
| ED | **0.139** | -0.005 | **-0.144** | 0.0% | 0.8% | 0.8% | **8.3%** | 1.7% | **-6.7%** | 120 |
| | (4.88) | (-0.27) | (-4.51) | (-1.75) | (-1.17) | (1.00) | (4.09) | (-0.58) | (-2.37) | |
| FIA | -0.023 | -0.043 | -0.020 | 6.7% | 2.2% | -4.4% | 2.2% | 0.0% | -2.2% | 45 |
| | (-0.64) | (-1.83) | (-0.43) | (1.79) | (-0.12) | (-1.02) | (-0.12) | (-1.07) | (-1.01) | |
| FoF | **0.102** | **-0.116** | **-0.217** | **0.0%** | 3.7% | **3.7%** | **15.2%** | **0.3%** | **-14.8%** | 297 |
| | (7.53) | (-8.35) | (-10.61) | (-2.76) | (1.33) | (3.35) | (13.97) | (-2.39) | (-6.75) | |
| GM | 0.080 | -0.078 | -0.159 | 0.0% | 4.4% | 4.4% | **8.9%** | 0.0% | **-8.9%** | 45 |
| | (1.16) | (-1.35) | (-1.61) | (-1.07) | (0.84) | (1.43) | (2.75) | (-1.07) | (-2.05) | |
| LSE | **0.100** | **-0.137** | **-0.237** | 2.7% | **4.9%** | 2.2% | **4.1%** | 2.5% | -1.6% | 364 |
| | (2.83) | (-4.65) | (-5.17) | (0.30) | (2.99) | (1.54) | (1.98) | (-0.03) | (-1.25) | |
| MF | **0.459** | **-0.426** | **-0.885** | 0.0% | 2.7% | 2.7% | **13.5%** | 3.6% | **-9.9%** | 111 |
| | (7.51) | (-5.81) | (-8.28) | (-1.69) | (0.14) | (1.74) | (7.43) | (0.74) | (-2.64) | |
| MS | **0.089** | **-0.133** | **-0.222** | 0.0% | 4.4% | **4.4%** | **9.9%** | 0.0% | **-9.9%** | 91 |
| | (2.01) | (-2.63) | (-3.75) | (-1.53) | (1.16) | (2.02) | (4.52) | (-1.53) | (-3.08) | |
| All | **0.132** | **-0.131** | **-0.263** | **1.0%** | **3.7%** | **2.7%** | **9.3%** | **1.3%** | **-8.0%** | 1,265 |
| | (8.86) | (-9.54) | (-12.61) | (-3.35) | (2.77) | (4.44) | (15.56) | (-2.63) | (-8.93) | |

The hedge fund categories are: convertible arbitrage (CA), dedicated short bias (DSB), emerging markets (EM), equity market neutral (EMN), event driven (ED), fixed income arbitrage (FIA), fund of funds (FoF), global macro (GM), long/short equity (LSE), managed futures (MF), multi-strategy (MS), and others (O).

**Figure 1: Yearly averages of the coefficients of mean reversion.**

This figure shows the annual averages, between 1926 and 2008, of the coefficients from daily regressions where stocks' five day future excess returns are regressed on each of the stocks' past five day's excess returns, excluding current day's return (regression 1 described in the text). Excess returns are calculated relative to the corresponding equal-weighted Fama and French industry indices. Here $\hat{\beta}_{t-\tau}$, where $\tau \in [1,5]$, denotes the annual average of the estimated regression coefficients for the past returns on day $t$-$\tau$.

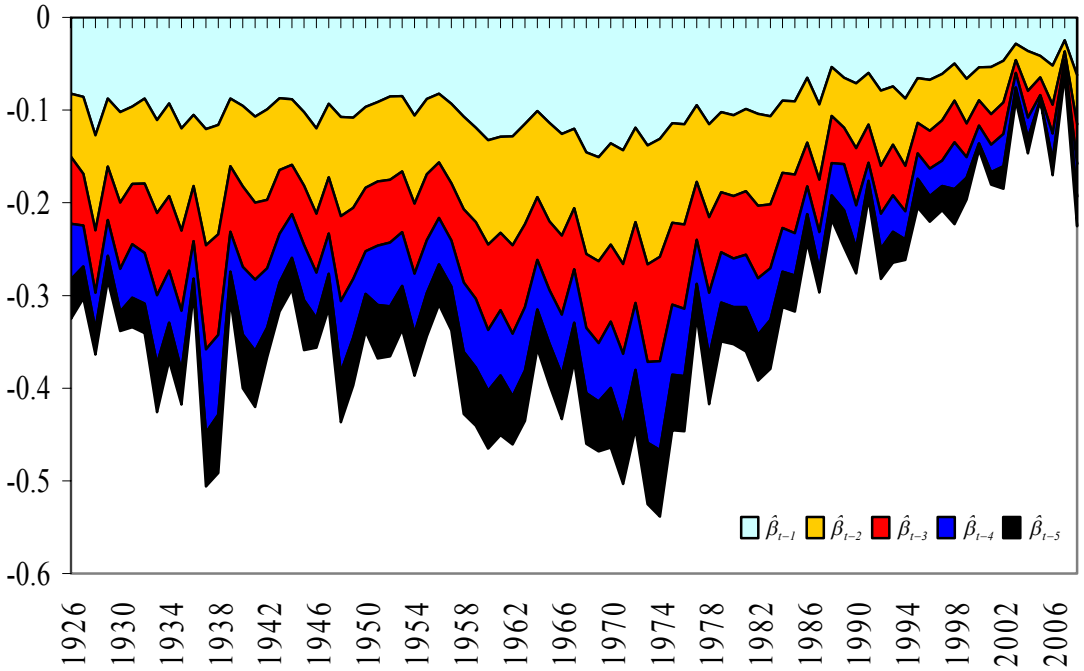

**Figure 2: Monthly returns from the immediacy providing trading strategy.**

This figure presents the monthly returns during our sample period 1926-2008 from the immediacy providing trading strategy. In this strategy long positions are taken on the quartile of stocks with the highest expected 5-day returns and short positions are taken on the quartile of stocks with the lowest expected 5-day returns. The rankings are made using predicted 5-day returns that are calculated using 100-day moving averages of coefficients from regression (1), until 6 days prior to taking positions. Return is the average of returns of all open positions.