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Market downturns, zero investment strategies and systematic liquidity risk

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Abstract

We analyze the behaviour of returns of various zero-investment (ZI) strategies motivated by the well-reported return crashes witnessed for momentum anomaly in down market states (DMS). We find that momentum crashes during market downturns are not unique. Instead, our results show that an alternating return generating process is at work across ZI strategies: almost half of ZI strategies exhibit momentum-like tendencies while the remainder displays an opposite pattern. In sum, this design is linked to the sign of systematic liquidity beta and the strength of falls/rises depend on the illiquidity gaps between the long and short portfolios of studied ZIS.

JEL Codes: G10, G12, G15

Keywords: Momentum crashes; market downturns; zero-investment strategies; systematic liquidity beta; illiquidity gaps

Introduction

Reportedly, returns on momentum strategy are lower during down market states (DMS onwards, Cooper et al. 2004). Daniel and Moskowitz (2016) show that large negative returns in momentum anomaly – crashes – are predictable as they mostly occur when the market rebounds in market downturns (the latter two are also known as predictors for momentum crashes). Butt and Virk (2017) report that the variation in market liquidity in DMS is the most robust explanation for momentum crashes. This finding hinges on the well-established evidence that the short-leg of momentum strategy, the loser portfolio is more illiquid than the log-leg of momentum strategy, that is the winner portfolio (Lesmond et al. 2006, Avramov et al. 2016, among others). Further, Amihud (2002) notes that illiquid stocks are more exposed to unexpected changes in market liquidity implying loser portfolio's sensitivity to changes in market liquidity will be higher than the winner portfolio of momentum strategy.

We hypothesize that the large fluctuations in returns for any zero-investment Strategy (ZIS) such as, momentum strategy, during DMS are exaggerated responses of illiquid stocks to market liquidity.[1] For instance, due to relative differences in the illiquidity of the long and short portfolios of momentum strategy, wherein the short portfolio is more positively exposed to market liquidity than long portfolio. The momentum based ZIS is overall, negatively linked with the systematic changes in market liquidity. This negative liquidity beta[2] attached with momentum strategy, specifically in DMS translates, into higher/lower returns for short/long portfolio when market liquidity increases. Therefore, overall the average returns for momentum strategy in DMS when market liquidity decreases/increases should be higher/lower.

We assert that there is a common denominator for all momentum like ZI strategies, such that they offer higher/lower returns when unexpected fall/rise in market liquidity is witnessed in DMS. For ZI strategies following an opposite design to that of momentum anomaly. Such that, the long side is more positively exposed to market liquidity than short side, should exhibit overall positive relationship with the changes in systematic liquidity e.g. value ZIS based on Book-to-Market (BM)

[1] Usually, A zero investment strategy is long by one US dollar long a with respect to an investing criteria or stock characteristic and goes one US dollar using the other end of same stock characteristic. For example, value based ZI strategy uses the Book-to-Market (BM) ratio of the stocks and goes one US dollar long in high BM ratio stocks and shorts low BM ratio stocks by the same amount. The investment strategy is devised such that the long-short portfolio difference will provide the investor a positive expected return.

[2] The liquidity related beta for momentum strategy is -4.223 with the t-stat of -2.676.

ratio. To this effect, Asness et al. (2013) show that value and momentum anomalies are not only negatively correlated between them but also have alternating exposures to changes in systematic liquidity.

We test for the exposures of 14 ZIS to changes in market liquidity during DMS. Our results show that almost half of the ZIS exhibit qualitatively momentum like behavior during DMS. The remainder display an opposite pattern in market downturns. Accordingly, we divide ZIS into two groups; one, which have momentum like liquidity betas i.e. negative liquidity beta and two, the ones which have positive liquidity betas. The negative liquidity beta strategies reconcile with investor's desire for flight to liquidity (Amihud, 2002): as the returns on such ZIS fall less when market liquidity decreases in DMS. This is because the short (long) leg of such ZIS bundles illiquid (liquid) stocks. Accordingly, when market liquidity decreases, the returns on short side of ZIS depresses more in comparison to long side. This results in higher returns for negative liquidity beta ZIS in DMS when market liquidity decreases. However, the cost for 'flight to liquidity' driven investment motives is momentum like crashes in DMS when market liquidity improves. Conversely, average returns on ZIS with positive liquidity beta find their returns decrease/increase when market liquidity decreases/increases in DMS. The decrease/increase in the returns of negative/positive liquidity beta ZIS is further boosted when market liquidity and market returns rebound simultaneously in DMS.

We approximate illiquidity gaps for ZIS by the differential in liquidity betas on the long and short portfolios across all ZIS as a guide – this is how the liquidity related literature (Acharya and Pedersen 2005 and others) gauges the systematic liquidity exposure for stocks having varying level of illiquidity. Our results justify our assertion that average returns for ZIS with negative liquidity betas report largest negative returns in DMS when market rebounds and unexpected systematic liquidity is on the rise. Lastly, we note that the degree of crash (appreciation) in returns is a function of size of differential between the liquidity risk exposures of long and short position – illiquidity gaps – of positive/negative liquidity beta strategies.

Motivation and Related Literature

Cooper et al. (2004) and Daniel and Moskowitz (2016) have shown that momentum returns are lower following DMS, where these bearish market conditions are identified when three-year cumulative market returns in former study, and two-years cumulative market return in later study are negative, respectively[3]. Further the momentum crashes are more likely to happen when the market rebounds in a bear market.[4] Daniel and Moskowitz (2016) suggest that momentum strategies, despite having sizable economic returns from 1927:01-2013:03, have frequented huge losses in DMS. They proclaim that these losses are partially predictable when market rebounds amongst the prevailing high market volatility. Further the large overall average return on momentum anomaly is a compensation for bearing large such losses. This is much in line with the reasoning of Barroso and Santa-Clara (2015) that one dollar invested in a momentum strategy in July 1932 could only have been recovered by April 1963.

For the fact that asset pricing anomalies are abysmally explained by CAPM betas, and Fama-French three factor model as well (Cochrane 2011), the large downturns in these so called bets against systematic variations in discount rates requires an improved and clear understanding. We link these downturns with the higher illiquidity of the loser (short) portfolio of the momentum strategy in comparison to the illiquidity of winner (long) portfolio; this stylized fact is well cited (Lesmond et al. 2006 and Avramov et al. 2015). In the study of Grundy and Martin (2001) the downturns in momentum returns are linked with market betas. Such that, the momentum strategy is negative market beta strategy as loser (short) portfolio is more exposed to market risk. Further, in DMS, as reported by Daniel and Moskowitz (2016), this negative exposure towards market factor increases further[5]. In nutshell, momentum strategy witnesses large losses in DMS because the short leg of the strategy is composed of higher market beta stocks and their returns phenomenally increase when market rebounds in DMS[6]. Implicitly, any strategy whose short side is more exposed to market factor, as is momentum strategy, will fall victim to large return crashes as market conditions improve.

In that sense our study is an attempt to generalize the results of Grundy and Martin (2001) and Daniel and Moskowitz (2016) for other ZIS. However, in doing so we have linked the short and long portfolios of ZIS with the variation is market liquidity. This way we are in better position to

[3] The results are robust for both the definitions of the bear market; these results can be reported upon request.

[4] Brunnermeier et al. (2008) report a momentum like punctuation for carry trade in the currencies market.

[5] As p-227-228, Daniel and Moskowitz (2016) reported the market beta is -.576 with the t-stat of -12.5o in full sample for momentum strategy, whereas in DMS the market beta approaches to -1.131 with the t-stat of -13.40. In fact, in DMS when market rebounds this negative exposure of momentum strategy further increases.

[6] We are thankful to anonymous reviewer for pointing out remarkable consistency in our results and of Grundy and Martin (2001), such that short leg of momentum strategy has liquidity exposure which mimics the liquidity exposure of the long leg of beta strategy. This we have discussed in coming section.

rationalize the variation in average returns on these ZIS with different states. For instance, Acharya and Pedersen (2005) show that illiquid portfolios have higher average returns, volatility and systematic liquidity sensitivities than their liquid counterparts. Their return-liquidity relationship is consistent with the theoretical and empirical evidence in Amihud (2002) and Pastor and Stambaugh (2003). We seek to identify this liquidity related variations across various ZI investment strategies, and between their long and short portfolios, to unearth if there is a broad-based generality or if this relation is specific to momentum anomaly. As vindicated by the reported studies, momentum strategy is the primary focus in studying return crashes and other anomalies have not attracted sufficient attention. Our proposed framework i.e. changes in market liquidity and return behavior of ZI strategies during DMS is a first attempt to unravel the presence of systematic liquidity related explanation for hypothesized fluctuations in pricing anomalies.

AP anomalies and market liquidity measure

We approximate systematic liquidity using the FHT measure proposed by Fong et al. (2017). [8] To construct a measure of aggregate liquidity, we make use of all stocks, with share code 10 or 11, listed on NYSE, AMEX and NASDAQ stock exchanges and apply standard screens in excluding stocks, see Amihud (2002) for details. To estimate the liquidity betas on ZI strategies, we work with shocks to market illiquidity after applying AR (2) filtering scheme and indicate it as $illiq$. This is a widely upheld convention in the approximation of systematic liquidity risk for the US (Acharya and Pedersen, 2005; Sadka, 2006, among others) and international stock markets (Lee, 2011; Butt and Virk, 2015). This procedure is applied for the known stickiness of aggregate/stock liquidity (Amihud, 2002).

For simplicity, we follow Sadka (2006) and multiply the series of shocks to market illiquidity by minus one and label the transformed shocks to market liquidity as Liq . After this transformation $Liq > 0$ implies liquid systematic shocks at time t and $Liq < 0$ shows a decrease in market liquidity at time t. [9] We retrieve data for 14 AP anomalies, which are easily available from Ken

[8] On the construction of FHT measure, please refer to Fong et al.

[9] Post transformation of illiquidity measure into a liquidity measure, positive shocks to market liquidity reflect increase in market liquidity and vice a versa. Therefore, a positive liquidity beta for a particular ZI shows that the returns on a ZI strategy are expected to increase by an amount of liquidity beta as market becomes liquid. The negative liquidity betas show a proportional decrease in the expected returns for the strategy as market liquidity improves.

French's website for the pertinent sample period in our study. Namely, the employed ZI strategies are based on accruals (ACR), BM ratios, CAPM beta (BETA), Cash-Flow-Price ratio (CFP), Earning-to-Price ratio (EP), Investment (INV), Long-term-Reversal (LTR), market capitalization (SIZE), Short-Term-Reversal (STR), momentum (MOM), net share issues (NSI), operating profitability (OP), variance of daily returns (VAR) and variance of residual of Fama and French 3-factor model (RVAR). We also download the time series of monthly returns on the long and short portfolios of all the ZI strategies from Ken French's website.

ZI strategies, liquidity betas and changing market liquidity

Asness et al. (2013) shows that momentum and value anomalies have alternating exposures on changes in aggregate liquidity. We expect this design to be present in the cross-section of self-financed investment strategies as well and therefore begin our analysis with the estimation of liquidity betas for all the ZI strategies:

$$R_{i,t} = \beta_0 + \beta_i . Liq + e_{i,t} \qquad (1).$$

R_i is time series of monthly returns for long, short or ZI strategies, whereas β_i is the estimated liquidity beta (return sensitivity) of these return series to market liquidity.

Following the sign of liquidity betas across ZIS, we divide them into two groups: negative liquidity beta ZIS and positive liquidity beta strategies. As shown in panel A of Table 1, five out of six ZIS have negative liquidity betas significant at 1% critical t-values, whereas six out of eight ZIS have significant positive liquidity betas at the same significance levels. To establish links for the return fluctuations in ZIS given their liquidity beta, we provide average returns (AR) on all the ZIS in DMS across number of conditions known to predict momentum crashes.

It is obvious that full sample AR on all ZIS across both groups are positive, however, distinctions emerge as we estimate AR returns on these strategies when market liquidity increases i.e. *Liq > 0* or decreases *Liq< 0.* The AR under columns *Liq.AR < 0* and *Liq.AR > 0* indicate that negative liquidity beta ZIS have strictly positive average returns when market liquidity decreases and their average returns are lower than full sample AR when market liquidity increases. The opposite holds for positive liquidity beta ZIS when market liquidity decreases and increases. These differences between the two groups become starker as we present AR in market downturns i.e. DMS=*d*, and market rebounds, which following Daniel and Moskowitz, are notated as *'u'*.

The average returns on negative liquidity beta strategies are substantially lower in DMS when market rebounds i.e. *d.u.AR* and drive our conclusion that momentum-like crashing is widespread rather than a standalone phenomenon. An exact opposite pattern is observed in the same column for positive liquidity beta ZIS: AR on these anomalies are multiple times of their full sample AR for five out of eight ZIS. The reported AR under columns *d.Liq>0* and *d.u.Liq>0* show that sizeable decline in AR is observed in negative liquidity beta ZIS when market liquidity increases. These declines are larger than declines in column *d.u.AR*. Likewise, the return appreciation for positive liquidity beta ZIS is substantially larger for all eight ZIS in *d.Liq>0* than their full sample average returns. The simultaneous effect of market rebound and increase in market liquidity in DMS shown as *d.u.Liq>0* for BETA, SIZE, STR, LTR and BM strategies is far more than the appreciation noted in column *d.u.AR*.

Taken together, these large return declines and magnifications for the two group of ZIS in DMS represent extreme arbitrage opportunities.[10] For instance if an investor designs a self-financing investment strategy which shorts VAR strategy and buys the composite BETA strategy his/her return expectation could be as large as 13.62% and 17.63% per month during DMS when market rebounds and when market and market liquidity improves simultaneously. These phenomenal expectations should be taken with great caution: using frequentist inference probability of their occurrence is only 7.5% and 5.1% in full sample. Nonetheless, this stresses our assertion emphatically: the liquidity beta for above advocated ZIS (BETA-VAR) is 18.151 (t-stat 5.89).

To test our assertion regarding the illiquidity gap between the long and short portfolios of the ZIS, we report liquidity betas on long, short and on ZIS in Table 2. We separate the effect of rises and falls in market liquidity during DMS by introducing two interactive variables: *d. Liq > 0* and $abs|d.Liq < 0|$.[11] In essence, following three equations are tested

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[10] We are thankful to an anonymous referee in pointing out the opportunities which different combinations of anomalies may offer under extreme conditions.

[11] We make negative shocks to market liquidity positive such that abs|d.Liq < 0| indicates decrease in market liquidity, this will ease the interpretation of equation (2) and (3), as now the signs on βi should be different.

$$R_{i,t} = \beta_0 + \beta_i d.Liq > 0 + e_{i,t} \quad (2),$$

$$R_{i,t} = \beta_0 + \beta_i.abs|d.Liq < 0| + e_{i,t} \quad (3),$$

and

$$R_{i,t} = \beta_0 + \beta_i d.u.Liq > 0 + e_{i,t} \quad (4).$$

The last equation analyses the interactive variable $d.u.Liq > 0$ indicating contemporaneous increase in market liquidity and market returns in DMS.

Our results in Table 2 across panels B, C and D show that the short portfolios of the negative liquidity beta strategies are highly sensitive to shocks to market liquidity in DMS, in comparison to their long portfolios. For instance, in panel B the three negative liquidity beta strategies VAR, RVAR and MOM find their liquidity beta more negative in DMS when market liquidity increases than the liquidity betas for the full sample as shown in panel A. These liquidity betas reconcile with the average returns on these strategies shown in Table 1, such that in DMS when market liquidity increases ($d.Liq > 0$), the returns on these negative beta strategies depress the most. Similarly, in panel C the negative beta strategies have positive exposure in DMS when market liquidity decreases, this effect is specifically significant for VAR and RVAR, as shown in Table 1, such that the average returns on negative beta strategies are higher in DMS when market liquidity decreases ($d.Liq < 0$). Lastly, in in panel D, when market liquidity and returns increase simultaneously in DMS, then the liquidity betas are highly negative and significant for VAR, RVAR and MOM. This phenomenal decrease in liquidity betas match with the extraordinary drop in average returns as shown in column ($d.u.Liq > 0.AR$) of Table 1. This indicates that negative beta strategies have the lowest returns in DMS when market liquidity and return increases.

An exact opposite pattern is on view for the eight positive liquidity beta ZIS. That is, their long portfolio has higher sensitivity to market liquidity which results in a large illiquidity gap when market liquidity is increasing and justifies the large return increases on them when market is in $d.Liq > 0$, see panel B of Table 2. These high positive betas indicate that average returns as shown in column $d.Liq > 0.AR$ of Table 1 are higher for strategies such as BETA, SIZE, STR, LTR, and BM . In panel C, when market liquidity decreases in DMS the positive liquidity beta strategies have negative exposure towards market liquidity. These exposures are at least significant for BETA and SIZE strategy, consequently we see the average returns are negative for these strategies as shown in Table 1, column $d.Liq < 0.AR$. More importantly, in panel D of Table 2 the strategies such as BETA, SIZE, STR, LTR, and BM have the larger and significant liquidity related beta. Accordingly, the average returns as shown in Table 1 under column ($d.u.Liq > 0.AR$) are the highest for these strategies.

There is also an interesting finding for the liquidity related betas of short leg of momentum strategy as they track the liquidity betas on the long leg of BETA strategy in overall sample as shown in panel A, in fact there is quite surprising similarity in these liquidity related betas in different states shown in panels B, C and D. As suggested in the Grundy and Martin (2001), the loser (short) portfolio is composed of higher beta stocks, whereas the long side of BETA is also composed of 10% of those stocks with the highest market betas. Therefore, it is not surprising that the loser (short) portfolio of momentum strategy is behaving much akin to high beta (long) portfolio of BETA strategy.

Conclusion

Our analysis extends the evidence in Daniel and Moskowitz (2016) and shows that momentum-like crashes are widespread across ZIS. These crashes across ZIS can be isolated for several investment strategies depending on the sign of systematic liquidity betas for a ZIS. In fact, ZI strategies with negative (positive) market liquidity betas are exposed to market liquidity for going short (long) in a portfolio whose systematic liquidity exposure is more than the long (short) side portfolio. Depending on these illiquidity gaps, the extent of large return declines (increases) across negative (positive) liquidity beta ZIS is determined when market liquidity decreases in DMS.

Besides well reported 'flight to liquidity' motives, these alternative patterns are best explained by the undertaken asset allocation strategy in designing a ZI strategy on how to mitigate or bet on illiquidity risk. To this effect, our evidence shows that negative liquidity beta ZIS bundle stocks in the long and short portfolios to hedge against extravagant illiquidity risk: these strategies have positive payoff even in DMS when market liquidity is freezing. Unsurprisingly, neutral liquidity beta ZI strategies – with small illiquidity gaps – do not witness substantially large return fluctuations in DMS. These ZIS evade large crashes and upswings, which is a vindication of developing investment plans by apportioning illiquid stocks to both long and short portfolios and thus reducing overall illiquidity gap. Overall, the long-short liquidity beta differences of ZIS can be taken as ex-ante guiding principle for ex-post behaviour of the returns in bear market conditions.

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Table 1 Relationship among Returns on Anomalies in DMS, Market Rebounds and Changes to Market Liquidity

This table provides the relationship of returns for two set of ZI strategies one, which have negative liquidity risk exposures and two, whose payoff function is positively linked to unexpected increases in market liquidity. The descriptive statistics for negative liquidity beta ZI strategies are compiled in Panel A for the period July 1963 – December 2012, where β_{Liq} is market liquidity beta on ZIS as implied by equation 1, liquidity betas in bold imply significance at 1 percent critical values. AR represents full sample average returns. Further *Liq.AR > 0* and *Liq.AR < 0* show the average returns across ZIS when market liquidity increases and decreases, respectively. The *d.AR* are the average returns on these anomalies in DMS, which are indicated as *d =1* when the return on the value weighted US market index for the last 24 months is negative and *d.u.AR* presents average returns when *d =1* and market rebounds to have higher return than the return on treasury bill in month *t* i.e. *u =1*. Whereas, *d.Liq >0.AR* and *d.Liq <0.AR* display DMS average returns on these anomalies when market liquidity increases or decreases contemporaneously. The column *d.u.Liq >0.AR* indicates the average return on the ZI strategies when in the down market states *d =1*, the market rebound *u =1* and increase in market liquidity *Liq >0* simultaneously occur. The row N indicates the total number of months for which returns are averaged for ZI anomalies for the respective column heading.

Panel A: Negative liquidity beta ZI strategies									
	β_{Liq}	*AR*	*Liq.AR > 0*	*Liq.AR < 0*	*d.AR*	*d.u.AR*	*d.Liq >0. AR*	*d.Liq <0 .AR*	*d.u.Liq >0. AR*
VAR	-9.719	0.522	-0.803	2.325	0.330	-7.528	-2.995	4.487	-10.329
	(-5.564)								
RVAR	-10.169	0.672	-0.722	2.568	0.412	-6.532	-2.911	4.565	-9.261
	(-6.347)								
MOM	-4.223	1.365	1.045	1.799	-0.365	-5.542	-1.966	1.635	-5.860
	(-2.672)								
OP	-2.870	0.217	-0.295	0.914	0.227	-2.707	-0.496	1.130	-3.154
	(-3.226)								
NSI	-2.287	0.463	0.250	0.753	0.723	-0.709	0.224	1.348	-1.344
	(-3.228)								
ACR	-0.875	0.457	0.339	0.617	0.473	-0.694	0.300	0.690	-0.496
	(-1.363)								
Panel B: Positive liquidity beta ZI strategies									
	β_{Liq}	*AR*	*Liq.AR > 0*	*Liq.AR < 0*	*d.AR*	*d.u.AR*	*d.Liq >0. AR*	*d.Liq <0 .AR*	*d.u.Liq >0. AR*
BETA	8.432	0.100	1.134	-1.306	0.136	6.087	2.505	-2.827	7.302
	(5.793)								
SIZE	10.040	0.332	1.742	-1.585	1.126	2.429	3.306	-1.598	4.226
	(9.839)								
STR	4.942	0.366	0.873	-0.324	1.328	4.088	3.023	-0.790	3.689
	(4.135)								
LTR	5.427	0.482	0.764	0.098	1.988	2.723	3.064	0.643	3.596
	(4.841)								
BM	4.110	0.512	1.033	-0.195	0.782	2.435	1.812	-0.506	3.576
	(3.936)								
CFP	1.482	0.496	0.752	0.148	0.614	0.240	0.776	0.411	0.476
	(1.550)								
INV	0.244	0.486	0.496	0.471	1.365	0.197	1.045	1.765	0.267
	(0.334)								
EP	2.135	0.478	0.676	0.208	0.744	0.018	0.775	0.705	0.052
	(2.211)								
N		571	329	242	90	43	50	40	29

Table 2 Relationship Between Market Liquidity and Returns on ZI Strategies in Different States.

The following table reports the liquidity related betas on the short and long side of ZI strategies. In panel A, out-put of equation (1) is shown for the short, long and difference portfolios for the full sample period. In Panel B liquidity related betas are estimated for short, long and for overall returns on ZI strategies in DMS when liquidity is increasing, similarly Panels C and D report return sensitivities when liquidity is decreasing and when market returns and market liquidity increases contemporaneously, respectively. T-stats are reported in parenthesis.

	Negative liquidity beta ZIS						*Positive liquidity beta ZIS*							
	VAR	*RVAR*	*MOM*	*OP*	*NSI*	*ACR*	*BETA*	*SIZE*	*STR*	*LTR*	*BM*	*CFP*	*INV*	*EP*
Panel A: Full Sample														
β_{short}	12.012	12.748	10.392	8.100	6.762	8.127	1.845	3.567	4.696	5.579	4.529	5.351	6.987	5.490
	(6.114)	(6.728)	(5.829)	(5.632)	(5.370)	(5.972)	(2.347)	(3.728)	(3.779)	(4.158)	(3.920)	(4.280)	(5.105)	(4.294)
β_{long}	2.293	2.579	6.170	5.230	4.475	7.252	10.277	13.607	9.639	11.006	8.638	6.833	7.231	7.625
	(3.075)	(3.212)	(4.417)	(5.056)	(4.477)	(5.697)	(5.833)	(10.124)	(5.935)	(7.637)	(6.716)	(5.930)	(6.042)	(6.544)
β_{Liq}	-9.719	-10.169	-4.223	-2.870	-2.287	-0.875	8.432	10.040	4.942	5.427	4.110	1.482	0.244	2.135
	(-5.564)	(-6.347)	(-2.672)	(-3.226)	(-3.228)	(-1.363)	(5.793)	(9.839)	(4.135)	(4.841)	(3.936)	(1.550)	(0.334)	(2.211)
Panel B: Increase in Liquidity in DMS														
β_{short}	31.103	32.753	33.625	16.133	15.784	16.358	4.983	7.867	7.097	9.488	10.785	11.858	15.702	12.562
	(4.614)	(5.023)	(5.557)	(3.255)	(3.655)	(3.481)	(1.869)	(2.412)	(1.670)	(2.066)	(2.739)	(2.777)	(3.347)	(2.878)
β_{long}	4.528	4.794	4.756	10.404	11.368	15.945	27.115	23.207	29.032	28.686	22.044	15.247	15.255	15.680
	(1.784)	(1.753)	(0.990)	(2.929)	(3.334)	(3.641)	(4.494)	(4.789)	(5.248)	(5.761)	(4.979)	(3.843)	(3.694)	(3.885)
β_{Liq}	-26.574	-27.959	-28.869	-5.729	-4.416	-0.413	22.132	15.340	21.936	19.197	11.259	3.389	-0.447	3.119
	(-4.452)	(-5.095)	(-5.503)	(-1.892)	(-1.830)	(-0.190)	(4.440)	(4.167)	(5.481)	(5.069)	(3.171)	(1.046)	(-0.181)	(0.951)
Panel C: Decrease in Liquidity in DMS														
β_{short}	-20.909	-21.174	-15.269	-11.608	-12.927	-15.441	-6.588	-9.543	-10.369	-15.209	-14.196	-15.313	-16.021	-15.065
	(-3.577)	(-3.736)	(-2.875)	(-2.713)	(-3.472)	(-3.825)	(-2.882)	(-3.415)	(-2.848)	(-3.882)	(-4.225)	(-4.200)	(-3.982)	(-4.036)
β_{long}	-6.558	-8.475	-11.034	-13.074	-10.871	-12.079	-18.845	-17.066	-14.182	-16.200	-11.875	-11.120	-9.651	-12.146
	(-3.016)	(-3.630)	(-2.682)	(-4.311)	(-3.712)	(-3.195)	(-3.606)	(-4.068)	(-2.930)	(-3.718)	(-3.075)	(-3.243)	(-2.699)	(-3.486)
β_{Liq}	14.352	12.699	4.235	-1.466	2.055	3.361	-12.257	-7.523	-3.812	-0.991	2.322	4.193	6.370	2.919
	(2.764)	(2.644)	(0.914)	(-0.561)	(0.987)	(1.799)	(-2.827)	(-2.350)	(-1.079)	(-0.297)	(0.753)	(1.504)	(3.016)	(1.034)
Panel D: Increase in Liquidity and market rebounds in DMS														
β_{short}	46.437	46.979	48.444	26.696	24.546	25.135	10.899	16.096	19.745	19.347	20.019	21.510	25.890	22.845
	(6.292)	(6.577)	(7.337)	(4.900)	(5.170)	(4.859)	(3.710)	(4.493)	(4.235)	(3.823)	(4.628)	(4.582)	(5.023)	(4.765)
β_{long}	9.314	10.950	12.112	18.201	19.896	24.115	40.673	30.895	40.285	37.020	33.031	21.993	24.291	22.380
	(3.323)	(3.632)	(2.276)	(4.660)	(5.326)	(5.003)	(6.154)	(5.785)	(6.640)	(6.756)	(6.832)	(5.030)	(5.358)	(5.030)
β_{Liq}	-37.123	-36.029	-36.332	-8.495	-4.650	-1.020	29.774	14.798	20.540	17.673	13.011	0.482	-1.598	-0.465
	(-5.651)	(-5.952)	(-6.277)	(-2.529)	(-1.733)	(-0.422)	(5.416)	(3.602)	(4.581)	(4.168)	(3.298)	(0.134)	(-0.582)	(-0.127)