An Examination of the Relationship between Short Selling and Corporate Malfeasance

The Leonard N. Stern School of Business
Glucksman Institute for Research in Securities Markets
Faculty Advisors: William Silber and Robert Whitelaw
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By Douglas Creutz

"Stock prices must reflect risk and future growth potential. When they don't, shams and frauds and even the honest are encouraged and enter the market and try to siphon off some of the largess. So in a sense, a bull market is a fertile ground for short sellers – but only if they really, really do their homework."

- Manuel P. Asensio, *Sold Short*

*"*You know what this column says about companies that pick public fights with short-sellers: Hold onto your wallets. Such was the case when Enron CEO Jeff Skilling called money manager Richard Grubman an "a------" after Grubman pressed Enron's chief accounting officer with detailed questions about the company's balance sheet."

- Herb Greenberg, TheStreet.Com, April 18, 2001 (when Enron was trading at $61)

I. Introduction

To say that the capital markets are currently fixated upon the problems of accounting fraud, poor corporate governance, and general management malfeasance would be an understatement. The collapse of equity markets over the past three years, beginning primarily as a decline in high-priced technology and "New Economy" stocks, has now spread through the market as a whole. The stories of Enron, Worldcom, and Tyco have made headlines on a daily basis. Trillions of dollars of investor capital has been wiped out, while confidence in the stock market and corporate America is at lows not seen since at least the mid-70s. Just as it seemed impossible to lose money in the equity markets in the late 90s, so it now seems that stocks may never rise again.

However, there are two sides to every trade. Another phenomenon of the early 2000s has been the emergence of hedge funds as serious competitors for investor capital. Many of these funds eschew the long-only mandate of the mutual fund industry and instead seek to balance their risks by shorting as well as going long. In fact, some money managers operate primarily on the short side, identifying stocks that they perceive to be overvalued. They especially look for situations where they believe that management is

being less than forthcoming in telling the truth about the company's prospects. At last count there was approximately $4.2 billion at work in short-oriented hedge funds.[1]

The question this paper seeks to shed some light on is whether professional short sellers are effective at identifying corporate malfeasance before it is publicly revealed. By shorting the stock while it is artificially high, presumably they can make abnormal profits by covering once the malfeasance is revealed. Recent work (Asquith and Meulbroek, 1995; Dechow, Hutton, Meulbroek, and Sloan, 1999; Farinella, Graham, and McDonald, 2001; Desai, Ramesh, Thiagarajan, and Balachandran, 2002) tends to suggest that short sellers do earn abnormal profits. This paper attempts to go a step further and suggest a reason why short sellers are able to earn abnormal returns – in "short", they are able to discover or intuit material information relating to corporate fraud. They can then establish a short position before that information is fully priced into the market.

The major task for a study of this nature is finding a group of companies that is defined as having engaged in malfeasance *ex post* without exposing the sample to bias on the part of the researcher. To avoid this problem, we have used a sample of companies trading on the NASDAQ that settled class action lawsuits between November 1996 and June 2002. These companies were identified from issues of the Securities Class Action Alert, via a proprietary database. While settling a class action lawsuit alleging fraud may not actually equate to having committed fraud or other wrongful acts, we believe it is a reasonable compromise that avoids many problems in data set construction. After analyzing the data, we find strong evidence that short interest increases significantly on average during the class period, i.e. the period during which the alleged malfeasance was ongoing but had not yet been publicly disclosed. This observed increase persists even

[1] "Short Sellers Sharply Scrutinize Companies", USA Today, February 18, 2003.

after controlling for overall changes in NASDAQ market short interest over the class period. We also find that cases where short interest increased significantly also generally have large increases in trading volume. This could be explained by two factors: either (a) the increase in liquidity is actually driving the increase in short interest, as higher liquidity drives short selling costs down, or (b) the "market debate" about the activities of the company is driving volume up at the same time that short interest is increasing. Finally, we also find that the companies that have the largest rise in short interest during the class period tended to have smaller drops in price after disclosure of the malfeasance. We believe this reflects the short seller's role in market efficiency: as more people become aware of a possible fraud, and short the stock, the price of the stock is driven down towards its "correct" value.

II. Short Selling – Objectives and Obstacles

Short selling involves borrowing stock from a long holder and then selling it to another investor. The short seller must eventually close the position by buying the stock back and returning the shares to the investor from whom they were originally borrowed. Short sellers generally have one of three objectives (Brent, Morse, and Stice, 1990):

- Squaring out a long position to lock in a gain while avoiding capital gains taxes, also known as "shorting against the box."
- Hedging another position in a stock, for instance a long-call position, or constructing an arbitrage, for instance between two companies involved in a merger agreement.

- Speculative purposes, believing that a stock will decline on the basis of research and/or information that the short seller possesses and feels is not currently priced into the market. The short seller may feel that the market is mispricing publicly known information, or that the public information on which the market pricing is based is incomplete and/or false.

This paper is concerned with the third short-seller objective, and more particularly with the situation where the short seller is basing his position on the belief that material information has been omitted or withheld by the company in its financial statements and press releases.

Short selling generally involves more risk and higher cost than long positions. One reason for this is the asymmetrical nature of stock price distributions; they are bounded by zero on the low side but have no theoretical limit on the upside. Hence a short seller can earn a maximum profit equal to their initial investment, but has no theoretical cap on their upside loss. (Although no stock has ever actually gone to infinity, some of the dot-com stocks in the late 90s did a pretty good imitation.)

Short sellers also face procedural restraints. The first of these is the "uptick" rule, meaning that a short can only be initiated if the most recent trade in the stock went in a positive direction. This is intended to prevent waves of short selling from "artificially" driving down the price of the stock (though many have commented that no such restriction exists on the upside.) A second restraint is the need to "locate" the stock, i.e. to find a long holder who is willing to loan the shares to the prospective short seller. These may be shares held in "street name" for a retail investor at a brokerage through a margin account, or shares loaned by institutional investors. For stocks where shares are

in short supply for borrowing, prospective short sellers will face a fee to borrow the shares, levied by the broker. After completing the short sale, the seller must leave the cash in his account as collateral, where it earns an interest rate that may be slightly discounted from prevailing market interest rates. In addition, even after the shares have been located for the short sale, the shares can be called away if the original owner either sells the shares or transfers them out of the margin account. This requires the short seller to find another borrowing source. If that proves impossible, he will be "bought in", that is, forced to buy shares at the prevailing market rate in order to cover his original short sale obligation. If the stock has moved higher in the interim, this can be very costly. The general phenomenon of short sellers being forced to buy back shares at higher prices is known as a "short squeeze" and is often anecdotally given credit for sharp, fast rises in a stock's price.

Beyond the procedural obstacles facing a short seller, there are also other factors that can come into play. Lamont (2003) details a number of methods by which companies "fight back" against short sellers. He classifies these into three categories – "belligerent statements", "legal actions", and "technical actions." Belligerent statements generally involve little economic cost to the short seller, as "talk is cheap". However, legal action – generally lawsuits involving alleging price manipulation or libel – can certainly increase the costs of short selling, if only in legal fees. The third category, technical actions, generally involves the company trying to deliberately engineer a short squeeze. This is done either through public suggestions that shareholders withdraw their shares from margin accounts to prevent them from being loaned, or through attempts by

the company to move shares into friendly hands by having the company or management buy up large blocks of shares.

Given the difficulties, higher costs, and higher risks involved in short selling, one might expect that short sellers expect a higher return on their activities. This would imply that high short interest should be a bearish indicator, since the presence of many short sellers in a security would imply negative expected returns. Conventional Wall Street wisdom actually suggests that high short interest is bullish, either because the short sellers represent natural buying pressure when they eventually have to cover, or for more simple contrarian reasons. Earlier research tended to suggest that short interest had little information content; Woolridge and Dickinson (1994) study returns and short interest at both the market level and on a sample of randomly-selected individual stocks, and conclude that short sellers did not earn abnormal returns. However, Asquith and Meulbroek (1995) claim that random samples will tend to miss existing abnormal returns, since the vast majority of companies have very low short interest levels. They focus exclusively on firms possessing high short interest levels, and find significant abnormal negative returns for these high short interest stocks. Farinella, Graham and McDonald (2001) find similar results looking at a sample of NASDAQ stocks with high short interest, as do Desai, Ramesh, Thiagarajan, and Balachandran (2002). Dechow, Hutton, Meulbroek, and Sloan (1999) find that short sellers tend to position themselves in stocks with low fundamental ratios (earnings/price and book/price), and that these firms tend to have systematically lower stock returns. They believe that short sellers use these ratios as a proxy for temporary mispricing and/or evidence of other, unknown risk factors.

Lamont's (2003) study of anti-short selling activities by firms focuses on the abnormal returns of the stocks of these firms. He finds significant monthly abnormal negative returns on the order of 2% - a figure that compounds to roughly 27% annually. Lamont concludes that:

> A notable feature of the data is that many sample firms are subsequently revealed to be fraudulent. This paper has presented a rogue's gallery of shady characters, ranging from Charles Keating to Adnan Khashoggi. The evidence on subsequent stock returns suggests that in public battles between short sellers and firms, short sellers usually are vindicated by subsequent events. The evidence suggests that short sellers play an important role in detecting not just overpricing, but also fraud. Policy makers might want to consider making the institutional and legal environment less hostile to short sellers.

We now turn to the question of whether short sellers are effective at identifying corporate fraud.

III. The Data – Construction

In order to examine the relationship between corporate malfeasance and short selling, we must first identify a group of companies that fit the fraud profile. "Corporate malfeasance" can be broadly described as including the following:

- inaccurate or fraudulent accounting;
- withholding material information about the company's future prospects for the purpose of keeping the stock price high (and not for legitimate business reasons);
- illegal behavior on the part of management such as embezzlement;
- in general, any acts that could negatively affect the stock price and are not disclosed by the company (whether intentionally or through ignorance.)

Obviously, constructing such a sample from scratch proves exceedingly difficult. Potentially, the researcher could comb through press releases covering a given period of time, selecting companies that experienced adverse price reactions due to disclosures of malfeasance. However, such a method exposes the data set to explicit or implicit biases on the part of the researcher, and would undermine the credibility of the results.

Fortunately, an existing data set is available which solves these problems. The database we use is limited to cases alleging fraudulent inflation in the price of a corporation's common stock, and includes 357 securities lawsuits filed after December 22, 1995 for which settlements were reported by June 2002. Ideally, a company that chooses to settle a class action lawsuit alleging fraud would only do so if there was at least some merit to the plaintiff's claims, though in fact some are probably settled solely due to the costs of contesting a lawsuit. We assume for the purposes of this study that the companies in the database represent a group of firms that have engaged in some sort of malfeasance. If, in fact, some companies have not, then this would only tend to weaken the patterns we expect to see in the data.

The question we seek to answer is whether short interest anticipates fraud. We will examine this question by detecting whether short interest increases during the period of the fraud. In class action lawsuits the fraud period is defined as the class period, i.e., the period that the company's alleged fraudulent activities took place. The end of the class period generally corresponds to the date of the "curative disclosure" where management makes an announcement that corrects the fraud, e.g., corrects earnings misstatements, recalls a faulty product, etc. Only shareholders who buy or own shares

during the class period are eligible for compensation, since they are the ones who presumably were deceived about the true value of the company by management's actions.

Our approach takes short interest prior to the beginning of the class period as the "normal level" of short interest, and compares that to the short interest just prior to the end of the class period (and the curative disclosure.) If the end of class period short interest is significantly higher, then we may conclude, after controlling for other factors, that informed short sellers detected the malfeasance before it was announced to the market. In particular, they established a short position expecting that when the malfeasance was revealed, the stock would move downward, and they would profit.

The original database included 357 class actions with settlement dates ranging from November 1996 to June 2002. The data we use for the study includes 168 class actions; the other 189 are excluded for the following reasons:

- At the outset, we made the decision to conduct the study using NASDAQ-traded stocks only, since monthly NASDAQ short interest and trading volume data were readily available through the nasdaq.com website. This excludes 121 settlements.
- 64 settlements are excluded because there is no short interest data available prior to the class period. In the majority of these cases, the class period beginning date coincides with the company's IPO date, and thus there is no trading prior to the class period. A few other cases have class periods beginning prior to January 1995, which is the earliest date for which short interest data is available.

- 4 more settlements are excluded because the class period is less than two months. Monthly short interest data could not be used in these cases.

These 168 datapoints cover 166 different companies; two companies are repeat offenders.

To account for other influences on short interest, we include the following additional data for the period under study:

- Monthly company shares outstanding and stock prices, from the CRSP database;
- Monthly NASDAQ market short interest, from Bloomberg.
- Monthly NASDAQ market share volume and dollar volume trading data, and monthly NASDAQ market cap, from nasdaq.com

The last figures are necessary because no total NASDAQ market share count data is readily available. For this we use the following proxy:

> Estimated NASDAQ monthly market share count = NASDAQ monthly market cap / (NASDAQ monthly dollar trading volume / NASDAQ monthly share trading volume)

Estimating total NASDAQ shares outstanding is necessary to generate a NASDAQ market short interest ratio for control purposes.

IV. The Data – Characteristics

Table 1 (see Appendix) gives some descriptions of the average, median, and standard deviation of (short interest / shares outstanding) for two dates (hereafter referred to as "percent short"). The first, "beginning", is the month immediately prior to the beginning of the class period; the second, "ending" is the month immediately prior to the

end of the class period. On average, the increase from beginning to ending percent short is 64.8%; the median percent short increase is 107.8%. Table 2 includes data on the distribution of class period lengths in the data, with an average class length of approximately 1 year.

Table 3 gives the average and median percent declines in share price during the month in which the class action period ends, i.e. the month in which the malfeasance is disclosed. With an average drop of over 40%, the rewards to perceptive short investors are generally substantial. This establishes the benefit of being able to identify instances of corporate malfeasance.

Table 4 gives a sense of how the short positions evolve over time; for each case, we measure the percent short at time-quartiles. For instance, for a 12-month class period, we measure percent short at the 0-, 3-, 6-, 9-, and 12-month time intervals. We then take the ratio of percent short at each time-quartile to the beginning of period statistic to convert the percent short to a relative measure. The data in Table 4 tend to suggest gradually increasing short interest over time, which is consistent with a slow and incomplete dispersion of information through the market. (Note that the average figures are heavily influenced by the presence a few outliers; cases with class action periods of less than 4 months are excluded.)

V. Empirical Results

In this section, we use a number of statistical tests to determine whether short sellers anticipate corporate frauds.

V.i) Paired t-tests

We first use a paired t-test to compare the beginning and ending percent short for all the class actions in our data. We test the null hypothesis that the difference between the beginning and ending percent short is equal to zero. This test yields a t-statistic defined as the difference in the mean beginning and mean ending percent short, divided by the square root of the pooled variance times $(1/n_1 + 1/n_2)$. The results of the test are in Table 5. The T-statistic is –4.75, yielding a 1-tailed p-value of $2.15 * 10^{-6}$, allowing us to reject the null hypothesis with nearly absolute certainty. Hence, it does appear that there is a significant increase in short interest for our companies during the class period.

One possible reason for this increase could be the generally increasing market short interest during the late 1990s; this would definitely show up in our data. Therefore, we conduct another paired t-test where we measure relative percent short, defined as (company percent short) / (NASDAQ market percent short) at the beginning and end of the class periods. This normalizes the data relative to overall market short interest changes. The sample's average beginning percent short is 54% higher than the market average, and ending percent short is 139% higher than the market average. The results of the test are in Table 6. For this test, the T-statistic is –4.41, yielding a 1-tailed p-value of $9.30 * 10^{-6}$, still allowing us to reject the null hypothesis with near certainty. Even adjusting for overall market short interest increases, there does appear to be something else going on which is driving short interest higher during the class period.

V.ii) Regressions

To further examine the relationship of fraud to short interest, we use a regression of the natural log of the change in percent short on the following independent variables:

- Length of class period, to see if longer class periods lead to higher increases in short interest;
- Change in NASDAQ market percent short, for reasons specified above;
- Change in stock price during the class period, to see if there are either momentum effects (increasing short interest as the price drops) or valuation effects (increasing short interest as the P/E or P/B ratios increase; since we are not looking at cross sectional data, and our individual cases have an average length of one year, we assume that the majority of the change in valuation measures is due to changes in price and not accounting measures) at work;
- Change in shares outstanding, and change in share trading volume, for liquidity effects;
- Market capitalization, for size effects; and
- Size of settlement, as a proxy for the "severity of the fraud."

We use natural logs to scale a number of the variables, both to fix the problem of asymmetrical (truncated) distributions and also to reduce the effects of outliers on the regression. The results of the regression are in Table 7. The regression has an adjusted r-squared of 19%, indicating the much of the variance in the dependent variable is unexplained by the independent variables.

Only two of the independent variables in the regression are statistically significant. The first, change in NASDAQ percent short, has a coefficient of 3.0463 and

a p-value of $1.02 * 10^{-3}$. This relationship is as we would expect; increasing market short interest indicates increasing short interest among the sample companies. Note that the coefficient of 3.0463 indicates that the percent change in company short interest varies roughly as the cube of the change in NASDAQ short interest.

The second significant variable is the change in trading volume, with a coefficient of 0.8556 and a p-value of $1.29 * 10^{-8}$. Thus, there appears to be a very significant relationship between increasing trading volume and increasing short interest. There are at least two (not mutually exclusive) possible explanations for this phenomenon:

- The increased short interest is a liquidity-driven phenomenon. Shorting costs decrease as liquidity rises; hence, if volume is increasing for some exogenous reason, then one might also expect short interest to rise.
- The increased volume coincides with the increased short interest. Companies that are less effective at concealing their malfeasance might be expected to attract high degrees of attention from investors and from the press. As more investors consider the possibility of fraud, and establish short positions in the company, the "stock debate" as personified by trading volume increases. Conversely, if no one has figured out that fraud exists, volume continues along more or less unchanged. This is also consistent with the recent phenomenon of short investors becoming more aggressive about broadcasting their beliefs in an effort to accelerate the process of market recognition of the alleged fraudulent behavior.

The other independent variables are not significant at the 5% level. For change in price during the class period, we also ran another regression (not shown) based on the

absolute change in price in case the momentum and valuation effects were offsetting each other in the data; however, the results were still not significant. The insignificance of the length of class measure may initially seem a bit surprising, since our descriptive data showed generally increasing short interest at increasing time quartiles. However, this makes some sense if you believe that the official announcement of fraud (the end of the class period) only occurs when enough people have already figured it out, i.e. "the jig is up." Hence, a longer class period may be indicative of a more successful fraud, where it has taken market participants longer to figure it out. The expected short interest at the end of the class period for a longer fraud would not be expected to be larger than that of a shorter fraud. Finally, the constant term indicates an expected 43.4% increase in short interest before taking into account the effects of the independent variables; however, it too was not significant at the 5% level

As mentioned above, the significance of the change in volume variable suggests that the increase in short interest could be due primarily to liquidity effects. If this is true, then the additional short interest should have no "informational content". In other words, if short interest is rising because of increased liquidity, and not because informed short sellers are acting based on their perception of fraud at the target company, then the short sales should not be pricing any additional information into the stock, specifically information about the perceived fraud. To test this, we use a regression of the one-month change in stock price around the curative disclosure date on the natural log of the percent change in short interest. We also include the two significant variables from the prior regression (change in trading volume and change in NASDAQ short interest.) Two results emerge from the data:

- The constant term has a p-value of $5.80 * 10^{-37}$, and indicates an expected decline in the stock price (prior to controlling for the effects of the independent variables) of 34.23%.
- The change in company percent short variable has a coefficient of .0237 and is significant at the 5% level. This result implies if the short interest doubles over the class period, then the stock will have a positive excess return (relative to the base predicted by the constant term) of +1.64%. Neither of the other two independent variables is significant.

This suggests that short sellers are in fact helping to price information about the fraudulent activities into the stock, since the stocks experiencing higher increases in short interest also experience relatively better price performance around the disclosure date. As short sellers "gang-tackle" a company that they believe is engaging in fraud, the price is depressed, and the subsequent drop in price after the fraud is officially revealed is lessened, since the stock price already partly reflects the fraud information.

VI. Conclusion

Our results suggest that short investors do have at least some success in identifying companies involved in fraudulent behavior before the fraud is revealed. The question of whether volume leads or merely coincides with increasing short activity in these instances should be examined in more detail. However, we do believe that the relatively higher returns around the curative disclosure date that are coincident with higher increases in short interest support the argument that the increased short interest is information-based rather than liquidity-based.

If short investors are instrumental in helping to identify corporate malfeasance and properly price it into the market, then it is important that additional restrictions on short selling (as are often proposed in times of market difficulty) be resisted. In fact, the markets might well be better off in terms of efficiency if existing restrictions were loosened or lifted, and short sellers were allowed to ply their trade more freely. After all:

> Every informed investor who participates in the market makes the whole system that much more effective.
>
> - Manuel P. Asensio, *Sold Short*

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APPENDIX

Table 1: % Short Summary Statistics

	Beginning % Short	Ending % Short
Average	3.5%	5.7%
Median	1.7%	3.4%
Std Deviation	4.7%	6.5%

Table 2: Length of Class Period

Months	N	Months	N
2	1	19	1
3	11	20	1
4	8	21	1
5	9	22	1
6	10	23	4
7	12	24	4
8	13	25	0
9	15	26	2
10	12	27	2
11	11	28	3
12	16	29	2
13	4	30	0
14	6	31	1
15	4	32	0
16	4	33	1
17	3	34	1
18	2	35	0
		36	3

N	168
Average Length	11.9
Median Length	10.0

Table 3: Post-Disclosure Price Change

Average	-39.1%
Median	-40.8%
Std Deviation	26.1%

Table 4: % Short Evolution, Relative To Beginning % Short

	Beginning	1st Quarter	2nd Quarter	3rd Quarter	Ending
Average	1.00	6.22	29.54	41.06	56.73
Median	1.00	1.02	1.24	1.32	1.62
Std Dev	0.00	52.51	265.77	404.14	515.35
N	156	156	156	156	156

Table 5: T-test Paired Two Sample for Means Comparison of Beginning and Ending Short Interest Unadjusted

	SIBegin	*SIEnd*
Mean	0.0345	0.0568
Variance	0.0022	0.0042
Observations	168	168
Pearson Correlation	0.45	
Hypothesized Mean Difference	0.00	
df	167	
t Stat	-4.75	
P(T<=t) one-tail	2.15E-06	
t Critical one-tail	1.65	
P(T<=t) two-tail	4.29E-06	
t Critical two-tail	1.97	

Table 6: T-test Paired Two Sample for Means Comparison of Beginning and Ending Short Interest Relative to NASDAQ Market % Short

	Beg	*End*
Mean	1.54	2.39
Variance	4.43	7.05
Observations	168	168
Pearson Correlation	0.47	
Hypothesized Mean Difference	0.00	
df	167	
t Stat	-4.41	
P(T<=t) one-tail	9.30E-06	
t Critical one-tail	1.65	
P(T<=t) two-tail	1.86E-05	
t Critical two-tail	1.97	

Table 7: Regression of Change in Company % Short on Multiple Variables

Regression Statistics	
Multiple R	0.47
R Square	0.22
Adjusted R Square	0.19
Standard Error	1.72
Observations	168

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	7	136.89	19.56	6.63	6.93E-07
Residual	160	472.19	2.95		
Total	167	609.08			

	Coefficients	*Std Err*	*t Stat*	*P-value*
Intercept	0.3605	0.2819	1.28	0.20
Length of Class Period	-0.0283	0.0195	-1.45	0.15
LN Chg NASDAQ % Short	3.0463	0.9100	3.35	1.02E-03
LN Chg Price	0.1984	0.2017	0.98	0.33
LN Chg Shrs	-0.3962	0.4466	-0.89	0.38
LN Chg Volume	0.8556	0.1427	6.00	1.29E-08
Market Cap	4.54E-08	1.06E-07	0.43	0.67
Settlement	-4.17E-09	5.66E-09	-0.74	0.46

Table 8: Regression of 1 Month Change in Company Share Price Around Curative Disclosure Date on Multiple Variables

Regression Statistics	
Multiple R	0.21
R Square	0.05
Adjusted R Square	0.03
Standard Error	0.26
Observations	168

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	3	0.52	0.17	2.62	0.05
Residual	164	10.88	0.07		
Total	167	11.40			

	Coefficients	*Std Err*	*t Stat*	*P-value*
Intercept	-0.4191	0.0252	-16.61	5.80E-37
LN Chg Company % Short	0.0237	0.0116	2.04	0.04
LN Chg NASDAQ % Short	0.1199	0.1288	0.93	0.35
LN Chg Volume	0.0099	0.0218	0.45	0.65