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THE GOOD NEWS IN SHORT INTEREST: EKKEHART BOEHMER, ZSUZSA R. HUSZAR, BRADFORD D. JORDAN 2009 REVISITED

by

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A report submitted in partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE in

Financial Economics

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Introduction

There are a few ways to examine excess market returns in financial literature. One common model used was the Capital Asset Pricing Model or the CAPM. In more recent years some researchers use the Fama French 3 Factor model (FF3F). Using this FF3F model researchers and investors alike have been searching for those excess returns, or the returns above what the market achieves, because everyone would like to “beat the market” as they say. In Boehmer, Huszar, and Jordan’s 2009 paper “The Good News in Short Interest”, the authors believe that they have found a way to get significant excess returns above the market using a simple strategy. When they back tested their strategy against historical markets their results were both statistically and economically significant.

According to Malkiel (1995), other research has shown that even the most qualified and intelligent investors, like mutual fund managers, fail to achieve returns that are in excess of the market return, after fees and expenses. For this reason the one common belief is that markets are efficient and that investor should be buying index funds. There is an opportunity that Boehmer et al (2010) found that by following short interest of other more sophisticated investors you can use a long and short investment strategy to potentially get excessive returns. The purpose of my paper is to first see if their findings are correct and second to see if after their paper was published if there was still an opportunity for excess returns or did investors use this strategy causing it to have less significant excess returns in the years following publication.
One key point that we have to believe and understand is that most short sellers are typically wealthy sophisticated investors, hedge funds and institutional investors. For this reason these types of investors know how to use the information available to everyone better than does the average investor. When they believe a stock is overvalued they don’t just buy it they will short it. In the presence of short selling constraints in the market, the uninformed investors are crowded out by the more informed investors. For example, if a stock is expensive to short, an uninformed investor will not go short, but the investor with information, and knows how to use it, will still short the stock. This is because he has the knowledge to use the information and is willing to make a bet on it even if it is relatively expensive to go short; if he is sure his information is correct. The short interest of a stock is often viewed as a measure of information of the informed investor’s opinion. Stocks that are avoided by short sellers give us information that the stock, at a minimum is not overvalued and are likely undervalued. Also stocks that are heavily shorted give us information that the stock is likely overvalued and will likely have poor performance. Knowing the short interest on stocks doesn’t give us the information that informed investors have, but it does give us information that the short sellers have information and it tells us the direction they are going with that information.

Boehmer et al (2010) look at stocks from the NYSE, NASDAQ, and AMEX from 1988 to 2005 and then they published their paper in 2010. First I looked at the time period following when they ended their study to the most current data, which is 2005 to 2013. To see if the publishing of their paper had any effect on this strategy, I also looked at the period from 2010 to 2013. I found that there were significant excess returns on lightly shorted stocks, both economically and statistically from 2005 to 2013, from the
time they stopped their data set to the most current data I could get, I also found that there were significant results during the time period of 2010 to 2013 after the paper was published. This possibly shows that the publication of “The Good News of Short Interest” by Boehmer et al (2009) did not have much impact on the use of this strategy. Or that possibly there are other issues that go unseen that prevent investors from implementing this strategy, like transaction costs. As for heavily shorted stocks there is a small negative monthly excess return, in some of the results, and they are mostly statistically significant. I believe that this opportunity still exists, even after the publication of this paper into financial literature, and that investors could potentially benefit from using some form of this strategy to get excess market returns.

For this study I have used the Fama-French 3-Factor (FF3F) model to back test this strategy of shorting high short interest ratio (SIR) stocks and going long low SIR stocks. I will go into more detail of the FF3F model later in the paper in the Methodology section.
Literature Review

In the study done by Boemher et al (2010) “The Good News in Short Interest”, they do a study on the monthly short interest using NYSE, AMEX, and NASDAQ listed stocks from 1988 to 2005. They show that during that time period stocks with the highest short interest have negative excess returns below the market. They also find that relatively heavily traded stocks with low short interest have both statistically and economically significant positive excess returns. In their study they calculate the short interest ratio or SIR for each stock and then group them into portfolios from lowest SIR to the highest. When they run their model controlling for risk factors Beta (risk premium), SMB (size premium), HML (value premium), and MOM (momentum premium) they find that for the time period between 1988 and 2005 stocks in the top 99% portfolio, highest SIR, have monthly excess returns, or alpha, of -1.2%. The stocks in the lowest 1% portfolio have an alpha of 1.4% monthly return. So if you buy stocks in the 1% portfolio and short stocks in the 99% portfolio you can achieve an excess monthly return of 2.6%.

In another study, “The Relationship Between Short Interest and Stock Returns in the Canadian Market” by Ackert and Athanassakos (2005). The authors look for the relationship between short sales and stock market returns using stocks sold short in Canada. In their study they define the SIR as the amount of shares sold short divided by the volume. They believe this gives a better idea of the proportion of shares sold short by the number of total shares traded not just the number of shares outstanding. The paper also finds that excess returns are negatively correlated to short sales. Although they only look at stocks that are highly shorted and they do not look at stocks that are lightly
shorted. In their study they find a negative yearly alpha for years 1991, 1992, 1993, 1994, 1998, 1999 of -3.41%, -4.11%, -3.59%, -3.86%, -9.01%, and -8.4% respectively. The alphas are pretty consistent until after 1994. The authors attribute this large decrease in excess returns to the up-tick rule that was instituted in 1994 causing short sale constraints in the market and thereby making markets less efficient and then prices take longer to reach there equilibrium.
Data and Methodology

For my data I went to Wharton Research Data Services. I collected data in three different data sets to get all of the information that I needed. For the first data set that I needed I pulled monthly data on all stocks in the market from CRSP, which includes shares outstanding, monthly returns, exchange id, date, and ticker. The second data set I pulled monthly data from Compustat on all stocks in the market which includes number of shares short by ticker and date. The third data set I got from the following website: http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html. This data included the Fama French 3 Factors, Rm – Rf, SMB, and HML. For all three of these data sets I pulled data from 2005 to 2013. I also created other sub-data sets from the original set to see the results during different time periods. One of those time periods, on which I will report on is 2010 - 2013. After merging these three data sets I then deleted all stocks that were not traded on the NYSE, NASDAQ, or the AMEX. I then calculated the short interest ratio by dividing the number of outstanding shares short at the end of the month by the number of shares total outstanding giving me the short interest ratio or, SIR. I created a lagged SIR variable called lagSIR so that I could see what the relationship the current month’s SIR had on the next month’s return. In doing this I could see if a stock with low SIR would have an increase in positive excess return above the market and conversely a stock with high SIR would have a decrease in negative excess returns. Then I ranked the data into deciles by the variable lagSIR creating 10 portfolios. I then sorted the portfolios by their ranking from 0 to 9 from lowest lagSIR to highest lagSIR. I then sort each of the portfolios by month and year so that the portfolios are rebalanced monthly. I also do this for 20 and 100 portfolios, to see if by lessening the
number of stocks in each portfolio, particularly the bottom and top portfolio, gives us more or less excess return. In essence I am only looking at the SIR at the end of each month to get the information I need to make the portfolios for the next month, since I can’t get real time data on short interest this should work well enough. Once the stocks are put into portfolios for the month I look at the end of the month’s return for each portfolio and analyze the data to see if it is statistically and economically significant. Doing it this way I am never looking into the future to make decisions in the present, I only look at current data at the time and then look at future data to see the results. This process gives me the monthly return of each portfolio and then when a new month begins the portfolios are rebalanced by the SIR for the month before and new portfolios are created. I understand one weakness of this strategy is that it is not economically feasible due to the fact of the amount of stocks involved as well as the amount of rebalancing that is going on, but for research purposes I will be able to see if I can get some statistically significant results using this strategy after the publishing of “The Good News in Short Interest”, Boehmer et al (2010).

To do my analysis I needed to run regressions using the Fama-French 3 Factor model on each stock in each portfolio. The Fama-French 3 Factor model looks like this:

\[ E[R_t] = R_f + \alpha + \beta_1(E[R_m] - R_f) + \beta_2SMB + \beta_3HML + \epsilon \]

Where \( E[R_t] \) is the expected return of a stock, \( R_f \) is the risk free rate, \( \alpha \) is the intercept, \( E[R_m] \) is the expected return of the market, SMB is small minus big, HML is high minus low, \( \epsilon \) is an error term and \( \beta_1, \beta_2, \beta_3 \) are coefficients. To make things simpler I subtract \( R_f \) from both sides which gives me:
\[ E[R_i] - R_f = \alpha + \beta_1(E[R_m] - R_f) + \beta_2SMB + \beta_3HML + \epsilon \]

I created a dependent variable on the left hand side and called it depvar which looks like:

\[ \text{depvar} = (E[R_i] - R_f) \]

Now I can run my model using the Fama French 3 Factor model. I run a regression by lagSIR portfolios and the intercept is what I am interested in, which I call alpha, or the excess return above the market, be it positive or negative.

The Fama-French 3 Factor, or FF3F, model takes into account firm size, SMB or Small Minus Big, and book-to-market ratio, HML or High Minus Low, as well as the market index risk factor, Mkt_RF or Beta as it is commonly called. These factors are motivated by the fact that historically small cap stocks and stocks with high book-to-market ratios or value stocks have higher returns and therefore have a higher risk premium that is captured in the FF3F. This model is able to explain more of a portfolio’s return than the CAPM. According to Gaunt (2004) the CAPM is solely determined by the market Beta. But several studies show that the CAPM market Beta has very little relation to stock returns, but on the other hand several studies show relationships between returns and variables like size (small cap vs. large cap) and book-to-market ratios (value vs. growth). Several other studies show that the single factor model or CAPM is not suitable to explain the relationship between risk and return, Gaunt (2004). According to Gaunt (2004) there is no agreed-upon model to replace CAPM. However, the most well-known model in current finance literature is the Fama-French three-factor model. In their early work, Fama and French find that size and book-to-market explain most of the variation in
US stock returns (Gaunt, 2004). The Fama-French 3 Factor model finds that the average returns on US stocks can be explained by the excess market return or the intercept coefficient of Mkt_Rf, a size factor SMB coefficient, and a book-to-market HML coefficient, equity factor. This is why I have chosen to use the Fama-French three-factor model to analyze my data.
Results

To begin with I am going to report the summary statistics of the data set from the time period 2005 to 2013 that I used, which will be included in Table 1 below. This shows the number of observations, the mean, the standard deviation, the minimum and the maximum of each variable in the data set.

<table>
<thead>
<tr>
<th>Variable</th>
<th>N</th>
<th>Mean</th>
<th>Std Dev</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>RET</td>
<td>231,562</td>
<td>0.0094</td>
<td>0.1309</td>
<td>(0.9208)</td>
<td>15.7742</td>
</tr>
<tr>
<td>SHROUT</td>
<td>231,562</td>
<td>142,118,179</td>
<td>424,002,647</td>
<td>50,000</td>
<td>10,780,377,000</td>
</tr>
<tr>
<td>shortint</td>
<td>231,562</td>
<td>4,064,789</td>
<td>9,093,719</td>
<td>68</td>
<td>364,540,928</td>
</tr>
<tr>
<td>Mkt_RF</td>
<td>231,562</td>
<td>0.0051</td>
<td>0.0446</td>
<td>(0.1723)</td>
<td>0.1134</td>
</tr>
<tr>
<td>SMB</td>
<td>231,562</td>
<td>0.0017</td>
<td>0.0217</td>
<td>(0.0422)</td>
<td>0.0579</td>
</tr>
<tr>
<td>HML</td>
<td>231,562</td>
<td>0.0009</td>
<td>0.0235</td>
<td>(0.0986)</td>
<td>0.0759</td>
</tr>
<tr>
<td>RF</td>
<td>231,562</td>
<td>0.0014</td>
<td>0.0016</td>
<td>0</td>
<td>0.0044</td>
</tr>
<tr>
<td>SIRATIO</td>
<td>231,562</td>
<td>0.0505</td>
<td>0.0896</td>
<td>0.0010</td>
<td>0.9998</td>
</tr>
<tr>
<td>lagsiratio</td>
<td>231,562</td>
<td>0.0504</td>
<td>0.0896</td>
<td>0.0010</td>
<td>0.9998</td>
</tr>
<tr>
<td>si_port</td>
<td>231,562</td>
<td>4.5004</td>
<td>2.8713</td>
<td>0</td>
<td>9.0000</td>
</tr>
</tbody>
</table>

Table 1: Summary Statistics for whole data set from 2005-2013

From the summary statistics in table 1 all of the data seems to be in order. The mean for RET, which is the average monthly return, is 0.0094 times that by 12 and you get .1128 or 11.28% annual return on all the stocks in the sample which is a realistic number. For variables SHROUT, shortint, and Mkt_RF all of the statistics seem to me to be within reasonable boundaries. The SMB and HML factor’s means are both positive
which I interpret to mean that on average value stocks outperform growth stocks, which is the SMB factor, and high book value stocks outperform low book value stocks, which is the HML factor. This goes along with Fama and French’s Theory and their development in the FF3F model. The risk free rate, RF, is in check with its mean, max and min. The SIRATIO and the lagsiratio should be above 0 and below 1, which they are and their mean comes in at 5% which seems correct. The standard deviation is high at almost 9% but that could be expected because a lot of stocks will have very little short interest and some will have very high short interest, so that makes sense. The short interest portfolios, or si_port, have a min of 0 and a max of 9, because those are our 10 portfolios 0-9. The mean comes in at 4.5, where I would expect being halfway between 0 and 9. Overall the data looks good and I expect that I should get very accurate results.

When I ran the regressions using the FF3F model and ranking the portfolios by short interest ratio I got some interesting results that I was not expecting. I did not plan on reporting these numbers because I was mostly interested in the intercept of the model, being the excess return, but I discovered some other interesting points that I will discuss and that are shown in table 2. I discovered similar results in all the time periods that I ran the model for but I will only show the results for each of the 10 portfolios for the time period of 2005 – 2013.
First of all, it is not surprising to see similar results to that of Boehmer et al (2010) in their study that the intercept is negative at -0.268% for the highest shorted stocks and then it monotonically increases as we go down through the portfolios all the way to the number 1 portfolio which has the highest monthly excess return of 0.674%. Using the strategy of selling short the highest shorted portfolio and then using the proceeds to buy the lowest shorted portfolio you could attain a excess return above the market of (.268 + .674) * 12 = 11.304% above the market return which is quite significant economically considering the market averages a 10-11% return annually. That is up to an average

<table>
<thead>
<tr>
<th>2005-2013</th>
<th>Portfolio</th>
<th>Intercept</th>
<th>Mkt_Rf</th>
<th>SMB</th>
<th>HML</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.00674</td>
<td>0.7866</td>
<td>0.15965</td>
<td>-0.03186</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>&lt;.0001</td>
<td>&lt;.0001</td>
<td>&lt;.0001</td>
<td>0.333</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>0.00299</td>
<td>0.90678</td>
<td>0.16024</td>
<td>0.04115</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>0.00252</td>
<td>0.97749</td>
<td>0.16098</td>
<td>-0.02542</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>0.0062</td>
<td>&lt;.0001</td>
<td>0.0002</td>
<td>0.563</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>0.0168</td>
<td>1.14814</td>
<td>0.28697</td>
<td>0.03564</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>0.0153</td>
<td>&lt;.0001</td>
<td>&lt;.0001</td>
<td>0.2501</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>0.00229</td>
<td>1.1441</td>
<td>0.55762</td>
<td>0.19914</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>-0.00039988</td>
<td>1.16916</td>
<td>0.61333</td>
<td>0.36138</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>0.595</td>
<td>&lt;.0001</td>
<td>&lt;.0001</td>
<td>&lt;.0001</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>-0.00049981</td>
<td>1.18276</td>
<td>0.74669</td>
<td>0.39776</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>0.5355</td>
<td>&lt;.0001</td>
<td>&lt;.0001</td>
<td>&lt;.0001</td>
<td></td>
</tr>
</tbody>
</table>

Table 2. 2005-2013 results of FF3F model with 10 ranked portfolios. Result then p-value under it.
annual return of around 22%. The results are also statistically significant considering that the 1 and 10 portfolios both have p-values less than .5%.

So those results are part of what is interesting and are the purpose of doing this paper. To see if there is still a trading strategy that can be done by following the short sellers and doing what they do, because they seem to have more information than the average investor. But what I also found interesting in table 2 is if you look in the column Mkt_Rf. This column contains the intercept, or beta coefficient, of the results of running the regressions using our FF3F model, and it tells us the market risk that we are undertaking in the portfolio. Much like the CAPM model result where we get the beta of a stock which is the calculated risk relative to the market risk. To interpret beta you simply multiply the beta of your stock, or portfolio in this case, by the return of the market and that is the return you can expect. In telling us the return it also tells us the risk. With a higher return comes a higher risk. So for example if our portfolio has a beta of 2 then we will achieve twice the return of the market, be that positive or negative. Because with a beta of 2 there is twice as much risk. So most of the time when someone says they can or are beating the market return it is because they are taking on more risk, hence the higher return. But if we can achieve a higher than market return without taking any extra market risk then we have found something.

In my results in table 2 in the column Mkt_Rf containing the beta risk that our portfolios are undertaking you will notice that as the short interest ratio decreases through each decreasing portfolio number the beta pretty much monotonically decreases from the highest shorted portfolio to the lowest shorted portfolio. The only ones that don’t really decreases in order are 4-7 as they are all between 1.12 and 1.148, but other than that the
highest shorted portfolio, number 10, has a beta of 1.19 with a negative monthly excess return of -.268%. Then the lowest shorted portfolio, number 1, has a beta of .78 with a positive excess return of .674%. In our previous strategy of going long portfolio 1 and short portfolio 10, we achieved most of our return from the long part, or portfolio 1. This is significant because if you wanted to only buy, or go long, and not short any stocks because of expenses or some other short constraints you can still attain a significant yearly excess return above the market of 8.08%, or a total average return of around 18%, while taking on less risk than the market risk. Because the beta of the market is 1 and the beta of portfolio 1 is 0.78.

There is another result from table 2 that is significant and it comes from the coefficients from the column SMB. Now these coefficients tell us if the portfolio is achieving excess returns because of the fact that there are more small capital stocks, which have higher returns on average, than high capital stocks. As you can see in table 2 in the SMB column the coefficients monotonically decrease from highest shorted portfolio to lowest shorted portfolio. I interpret this to mean that the higher shorted portfolios excess returns are more attributed by the SMB factor or by the fact that small cap stocks achieve higher returns than large cap stocks. Usually that is due to the increase risk that small caps carry with them, they are more risky and thereby have a higher return. So this goes along with the Beta decreasing as the portfolio short interest decreases, the number of small cap stocks in the portfolios goes down as well again reducing risk, making for a good buy and hold strategy for the lowest shorted portfolio.

As for the HML factor in table 2, the coefficients do seem to start high at the highest shorted portfolio and then start decreasing as the short interest ratio decreases.
But then at the number 5 portfolio and lower they are no longer statistically significantly different than 0. I take this to mean that for the higher shorted stocks there is a decreasing excess return that is attributed to the book value as you decrease the short interest ratio, meaning possibly that value stocks are more risking in the higher shorted portfolios but then in the lower shorted portfolios there is no effect of book value and the excess return of the portfolios. So perhaps for the lower shorted stocks there is no significant difference in excess return between value stocks and growth stocks.

To show the results in table 3 and 4, I put the table together with only the lowest and highest shorted portfolios, different than table 2 where I had all of the portfolios, but this way I wanted to show what the difference is in 10, 20 and 100 portfolios to see if there is any change is results as I reduce the number of stocks in each portfolio and only get the very highest shorted stocks and the very lowest shorted stocks. In table 3 is the results from the time period 2005 – 2013, which is after Boehmer et al (2010) stopped collecting data to the most recent data that I could collect, which is the end of 2013.
From table 3 I used the data from 2005-2013. You can see that the results are the same for the 10% and the 90% portfolio’s as the number 1 and 10 portfolio’s in table 2 and so I won’t discuss too much detail about these results other than we can see that by following a strategy of shorting the highest 10% short interest ratio stocks and going long the lowest 10% short interest ratio stocks we can achieve a significant positive excess return above the market both economically and statistically. Also as I mentioned before the beta coefficient for Mkt_Rf which is the portfolio Beta is a lot lower for the lowest short interest ratio portfolio, implying a less risk than the highest portfolio and less risk than the market.

I also wanted to see the results of dividing stocks into 20 portfolios and ranking them again by short interest ratio from lowest to highest, and see if there was much of a change in the results of our excess return and also in our risk. As you can see from the
5% and 95% portfolios there is a slight increase both in the positive return for the lowest short interest ratio portfolio and an increase in the negative return for the highest short interest ratio portfolio. Still both are economically and statistically significant. The annual excess return for the high and low 20 portfolios is 14% which is an increase of almost 3% from our results with just the 10 portfolios. This shows that if we increase the number of portfolios which decreases the size of each portfolio, making only the lowest SIR stock in portfolio 1 and the highest SIR in portfolio 20 we can achieve even better results than with only 10 portfolios. We also see that the betas are almost the same as with the 10 portfolio example making the 20 portfolios lowest SIR portfolio less than the market risk. Implying what we did above that if you wanted to do a buy only strategy you could just buy the lowest 5% SIR stocks and you would be taking less than market risk while at the same time achieving above market return. The SMB and HML are similar to the result for the 10 portfolio example and since that is not the interest of this paper I will not go into their meaning again.

Lastly I ranked all of the stocks into 100 portfolios by the SIR to see if that made a significant difference than the two other results that I have tried. My belief is that as I reduce the number of stocks in the lowest SIR portfolio to just a few of the very lowest SIR stocks and similarly reduces the number of stocks in the highest SIR portfolio to just the very highest SIR stocks, that I would find a significant increase in the excess returns or the intercept. Referring to table 3 again to the 1% row the intercept for that portfolio of stocks increased to 1.33% monthly excess return with a Beta of only .67. That means the return significantly increased and at the same time the risk significantly decreased by more than 10%. I believe this is due to the fact that there is only the very lowest shorted
stocks in this portfolio which means informed investors have no negative information and may even have positive information, therefore they will not short these stocks, hence the higher excess return. For the highest 1% or the 99% SIR the intercept is 0.00139 and is very insignificant. I find this result a bit unusual, because I was expecting to see that the very highest shorted stocks to have a very significant negative excess return but it seems like it is not significantly different than 0, and it is just not there. Since the result is 0 the strategy would be to just invest in the 1% portfolio and get a monthly return of 1.33% which comes to an annual excess return of 15.96% above the market. This could possibly be an average 26% over the long run. This is very economically significant.

What is also significant is the Beta is a lot lower and happens to be the lowest for the 1% portfolio at 0.67. So not only is the 1% portfolio give you the highest return, for this time period, but it also has the lowest amount of risk involved.

One explanation that could be playing a factor on the data is the fact that the data set is pulled from the time period 2005-2013 which included the crash of 2008-09 and then the recovery afterword. In my opinion the crash came on so suddenly that even informed investors were not able to have enough information to know what stocks to short and by the time we all knew what a crisis we were in, the crash was over and the stock market started its slow recovery. This could have caused short sellers to be a bit late to the show and they could have been shorting stocks a little bit late or just not shorting them at all because they knew the recovery was going to happen and so they wanted to stay out of the short sellers’ market. Leaving little, if any excess returns for highly shorted stocks. So perhaps this shows that this strategy does not work during a crash and a recovery. But one thing that is consistent in all three examples is that the
lowest shorted stock portfolio had a higher excess return in absolute value, and they also had significantly lower betas implying lower risk. So one possibility is that the best strategy to reduce risk and still get an excess return, and avoid the costs of short selling, may be to just invest all the money in the lowest shorted portfolio, because there is not a statistically significant excess return in the highest shorted portfolio.

Since I also wanted to see what the results were by isolating the time period to just after the publishing of the paper of Boehmer et al (2010), to see if there was still economically and statistically significant results. So I also ran a model using the same data except I only used the time period 2010 – 2013. The results should tell me if this is still a viable strategy up to the end of 2013, which is more current than the data they used in their study which ended in 2005. The results are shown in table 4.

<table>
<thead>
<tr>
<th>2010-2013</th>
<th>Intercept</th>
<th>Mkt_Rf</th>
<th>SMB</th>
<th>HML</th>
</tr>
</thead>
<tbody>
<tr>
<td>10%</td>
<td>0.00678</td>
<td>0.5509</td>
<td>0.06</td>
<td>-0.07141</td>
</tr>
<tr>
<td></td>
<td>&lt;.0001</td>
<td>&lt;.0001</td>
<td>0.3204</td>
<td>0.2008</td>
</tr>
<tr>
<td>90%</td>
<td>-0.00697</td>
<td>1.20344</td>
<td>0.90008</td>
<td>0.21495</td>
</tr>
<tr>
<td></td>
<td>&lt;.0001</td>
<td>&lt;.0001</td>
<td>&lt;.0001</td>
<td>0.0042</td>
</tr>
<tr>
<td>5%</td>
<td>0.0091</td>
<td>0.50728</td>
<td>0.12243</td>
<td>0.000496</td>
</tr>
<tr>
<td></td>
<td>&lt;.001</td>
<td>&lt;.0001</td>
<td>0.167</td>
<td>0.9952</td>
</tr>
<tr>
<td>95%</td>
<td>-0.00643</td>
<td>1.1106</td>
<td>0.86559</td>
<td>0.36576</td>
</tr>
<tr>
<td></td>
<td>0.0015</td>
<td>&lt;.0001</td>
<td>&lt;.0001</td>
<td>0.001</td>
</tr>
<tr>
<td>1%</td>
<td>0.01721</td>
<td>0.36586</td>
<td>0.33248</td>
<td>0.42513</td>
</tr>
<tr>
<td></td>
<td>&lt;.0001</td>
<td>0.0002</td>
<td>0.1136</td>
<td>0.0281</td>
</tr>
<tr>
<td>99%</td>
<td>-0.00276</td>
<td>0.99006</td>
<td>0.04053</td>
<td>0.02923</td>
</tr>
<tr>
<td></td>
<td>0.5653</td>
<td>&lt;.0001</td>
<td>0.8875</td>
<td>0.9118</td>
</tr>
</tbody>
</table>

Table 4. FF3F model results for time period 2010-2013
The first thing that you will notice is that there are still significant excess returns for all of these portfolios except for the 99% portfolio which is not significantly different than 0. Which is similar to the result that I obtained using the data from 2005-2013. This shows that there still was an opportunity using this strategy to get excess market returns following the publishing of Boehmer et al (2010). As I look at the numbers more closely I see that they are very similar. That could be because this data set is just a subset of the original data set. Still after taking that into account the excess returns in the years following Boehmer et al (2010), were actually a little bit greater in all cases except for the 99% portfolio where both data sets show insignificant results. This leads me to believe that this strategy of getting excess returns still worked after Boehmer et al (2010) published their paper, and could very well still work today.

A very interesting difference in this subset data set, 2010-2013, of the original data set, 2005-2013, is that the data from 2010-2013 portfolios show significantly less risk than the data from 2005-2013. There is a significant drop in beta from the highest shorted portfolio to the lowest shorted portfolio as there was in the 2005-1013 data. Also, mainly in the lowest shorted portfolios in the 10%, 5% and 1% case there is quite the decrease in market beta, showing that the risk of the portfolio is quite a bit lower than the market risk even while getting a substantial excess market return. For example in the 99% and 1% portfolios, the 99% portfolio almost has the exact same beta, but the 1% portfolios beta decreases from 0.67 to 0.365. That is a pretty low beta, especially when the excess return on the 1% portfolio for 2010-2013 is 1.72% a month that is over 20% a year in excess market return with significantly less than market risk. Also in the 5% and the 10% portfolios for 2010-2013 in table 4 there is a decrease in beta of 0.7815 to
0.5073 and 0.7866 to 0.5509 respectively. As far as SMB and HML go there were not very many significant results, most likely because there wasn’t enough data.

One possible theory to why the betas are so low for the lightly shorted stocks is because during this time period of 2010-2013 it was during a market recovery right after a market crash in 2010. This would make it less risky to invest in these lightly shorted stocks because they had hit rock bottom and the risk become less and less the lower they went. Because now they were more fairly priced or more than likely cheaply priced, and so there was little risk in buying these lightly shorted stocks. And of course the short sellers didn’t want to short them because of how far they had already come down and the greater likelihood that they would now go up; therefore these stocks were lightly shorted and low risk.
Conclusion

To be able find excess market returns, we need to be able to find alpha, or the intercept of the Fama-French 3 Factor model. One way to do this is to follow those who know how to use the information available; in this case it would be the short sellers. We don’t need to know the exact information, we just need to know the information that they have information, and this can be done by following short interest and calculating short interest ratios, or SIR. Stocks with low SIR are believed to be undervalued and not worth shorting for sophisticated investors, like short sellers, and those with negative information. Conversely stocks with high SIR are likely overvalued because they are believed to be overvalued by those that have information. It cost money to short a stock, so usually only those that have good information are willing to bet big on their negative information.

Using the Fama-French 3 Factor model to find positive and negative alpha for stocks with low SIR and high SIR respectively, I was able to construct portfolios and back test this strategy for the years 2005 to 2013, from when Boehmer et al (2010) stopped collecting data to the most recent data, and then also just for the years 2010-2013, which is the years following the publishing of their paper. For years 2010-2013 if you look at the lowest shorted 1% portfolio estimated an excess return of 16% a year. This was the best result for that time period. A long/short strategy for portfolios 5%/95% estimated an excess return of 14% a year. A long/short strategy for the portfolios 10%/95% estimated an excess return of 11.3% a year. For the last 4 years, 2010-2013 the results were a little different, but generally better using the exact same long short
strategy. Starting with the 1%/99% then the 5%/95% and then the 10%/90%, I estimated an excess return of 20.62%, 18.636% and 16.5% respectively.

Practically there are a lot of stocks in the all these portfolios and it will be difficult to construct a portfolio of your own to purchase and go short using this strategy, taking into account transaction costs and fees, since you are rebalancing monthly and you are going short on half your portfolio. Obviously the cheapest and the one that has proven to give the highest excess returns is the 1% portfolio. Where there are fewer stocks in each portfolio, being 100 portfolios total, and it is not beneficial to go short in the 99% portfolio. For three reasons, one is being because there is no significant alpha to be had, and two being transactions costs would be saved by not having to short stocks, so you only are making half the transactions. Thirdly, you don’t have to incur the expenses and interest of short selling, so it is cheaper as well. So in conclusion on paper it appear that by buying the 1% portfolio is the best investment choice based on the results from the 2005-2013 data and also the 2010-2013 subset data that showed that only buying the lowest shorted portfolio is significant and beneficial and less expensive. It is also the portfolio with the least amount of risk in both data sets with a beta of 0.672 for 2005-2013 and 0.365 for 2010-2013. It has the best reward with the least amount of risk.
References


