The IBS Effect: Mean Reversion in Equity ETFs

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Abstract

I investigate mean reversion in equity ETF prices at the daily frequency by employing a simple technical indicator, Internal Bar Strength (IBS). IBS is based on the position of the day's close in relation to the day's range. I use it to forecast close-to-close returns with statistically and economically significant results for most instruments. A simple strategy based on IBS generates an average alpha of over 30% p.a. before transaction costs. I show that equity index ETFs have had strong and consistent mean reverting tendencies since the 90s, and that these effects can be exploited as part of a profitable trading strategy. The IBS effect is stronger during times of high volatility, in bear markets, after high-range days, after high-volume days, and early in the week.

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Introduction

Equity indices exhibit mean reversion in daily returns. A simple and powerful way to capture this effect is the Internal Bar Strength technical indicator, which simply relates the closing price of a security to its daily range. When the closing price is near the bottom of the day's range, close-to-close returns on the following day tend to be higher than average, and vice versa.

The source of these mean reverting tendencies is difficult, if not impossible, to establish and is beyond the scope of this paper. Trading costs are extremely important when it comes to short term strategies, but the magnitude of the IBS effect, combined with the fact that it shows up in some of the most liquid securities in the world, is more than enough to overcome them. The IBS effect can also be combined with other trading strategies to enhance their returns.

Literature Review

There has been no treatment of the IBS effect specifically in the academic literature. Related issues such as intraday overreaction to news, and negative autocorrelation in daily returns have received some coverage, however.

Klößner et al. (2012) use measures derived from OHLC data, in a Brownian motion context, to test for intraday overreaction in the components of the S&P500 and XETRA-DAX indices. They find significant evidence for overreaction to bad news. Kudryavtsev (2012a;b) follows a similar, cross-sectional, methodology and applies it to close-to-close and overnight returns of DJIA constituents, finding evidence of overreaction and reversal.

Conrad et al. (1994), expanding on the work of Lehmann (1990), find evidence of overreaction (and subsequent negative autocorrelation, i.e. reversal) in the returns of individual securities with relatively high volume.

Data and Methodology

Data

The requirement of reliable OHLC values precludes the use of index or mutual fund data. As such, the analysis is constrained to ETFs and thus a relatively short period of time. The data used covers the period from the inception for each ETF to 31/12/2012.

Futures data is sourced from IQFeed in the form of back-adjusted continuous contracts at 1-minute frequency. Data on the market, size, value, and momentum factors as well as the risk free rate comes from Kenneth French's web page. Daily ETF data is sourced from CSI. Descriptions of the ETFs used can be found in Table 1, while descriptive statistics of their daily returns can be found in Table 2.

Methodology

The n-period IBS at time t is calculated as follows:

$$IBS_t(n) = \frac{1}{n}\sum_{i=0}^{n-1}\frac{Close_{t-i} - Low_{t-i}}{High_{t-i} - Low_{t-i}}$$

It takes values from 0 (if the close is the lowest value of the day) to 1 (if the close is the highest value of the day). Unless explicitly mentioned otherwise, I will be using the 1-period IBS in the rest of this paper.

Many of the ETFs used in this paper are relatively illiquid and thus any large scale implementation of an IBS-based trading approach would be difficult. On the other hand, several of the funds can provide ample liquidity. Significant trading costs and timing risk can be avoided through the use of limit on close (LOC) orders, with the limit set at the desired percentage of the day's range.

Trading costs in futures markets can be even lower: for orders without any price impact they are less than 4 basis points including commissions and spread for a full round-trip of the S&P 500 E-mini contract, which offers deep liquidity.

Results

Equity Index ETFs

The distribution of IBS values is U-shaped: extreme high and low values appear more frequently than those in the middle of the distribution (see Figures 1 and 2). There is also a slight tendency for the closing price to be above the middle of the range: 54.5% of IBS values are above 50%. The question of why closing prices tend to be near the extremes of the daily range instead of the middle is interesting, but beyond the scope of this paper.

In order to examine the predictive power of the IBS indicator, I separate days into 5 "buckets", based on the day's IBS value (i.e. IBS values between 0%-20% is the bottom bucket, etc.), and then average close-to-close returns for each bucket and ETF. The results can be seen in Table 3. There is an economically significant difference between low and high IBS values. For most ETFs, the returns following top and bottom bucket IBS readings are statistically significantly different from the average day at the 1% confidence level. Bottom-bucket IBS days are followed, on average, by a 38 basis point move upwards, while top-bucket IBS days are followed, on average, by a 14 basis point move downwards.

This asymmetry is an expected result of the long-term upward bias of equity prices. It may also be related to the so-called leverage effect, which leads to overreactions that are larger on

the negative side. The top bucket also contains more days, because high IBS readings are the most frequent. As such that bucket is less "selective".

Figure 3 shows average close-to-close returns plotted against IBS for all ETFs. It is clear that the relationship between IBS and close-to-close returns is not linear (and thus does not lend itself to linear regression analysis). Instead there appear to be two "thresholds", below and above which returns deviate significantly from the average.

Table 4 shows the probability of an up day depending on IBS value: the average difference between top and bottom buckets is 11.2%, with statistically significant results at the 1% level for most ETFs.

Increasing the value of n increases the size of the effect. The longer the period, the rarer and more significant the extreme readings, as can be seen in Table 5.

The IBS effect is also highly consistent through time. Table 6 contains returns to a simple IBS strategy (going long when an ETF has an IBS of 0.2 or less, and going short when an ETF has an IBS of 0.8 or more) by ETF and year, showcasing the remarkable consistency of the mean reversion effect.

These ETFs are not hedged against currency fluctuations. As such, it is possible that the IBS effect is due to currency returns and not equity returns. Examining ETFs associated with major currencies (Eurozone, U.K., Japan, Australia, and Canada) I found no evidence of the ETF IBS being related to next-day currency returns, thus rejecting any currency-based explanation for the effect.

Splitting the ETFs by developed/developing economies shows that the IBS effect has similar power in both groups. The difference between close-to-close returns after top and bottom bucket IBS values is 0.570% for developed countries and 0.452% for developing countries.

A trading strategy based on the IBS effect would trade frequently, making transaction costs important. The assets used in this paper are not a homogeneous group; some are ETFs with little volume, where the price impact of large trades would be sizable. On the other hand, the IBS effect is prevalent in U.S. equity indices as well, where both equity and futures markets provide ample liquidity and low transaction costs. Furthermore, trading at the closing auction can be used to avoid the bid-ask spread.

When Does Mean Reversion Occur?

I use the NASDAQ 100 (NQ) and S&P500 (ES) E-mini futures contracts, which continue to trade overnight, to investigate the timing of the IBS effect. Using 5 minute data, Figures 4 and 5 show cumulative returns overnight and intraday until the next stock market close, after low and high IBS extremes respectively.

The first point of interest in these graphs are the significant and sudden movements, in the direction of mean reversion, that occur in the 15 minutes between the close of the stock markets and the futures market. This effect disappeared around August 2010, but provided stable returns until then.

This spike is subsequently reversed approximately over the next hour. Overnight there appears to be a large difference between the moves in NQ and ES. NQ displays significant movement overnight, with most of the mean reversion being done before next day's open. In the case of ES, however, mean reversion tends to occur toward the end of the next day, in a shorter and more explosive move.

Local vs U.S.-based ETFs

Many countries do not have any usable ETFs, or have inadequate data, making this analysis somewhat problematic. The few countries that do have adequate data (France, Austria, Germany, Spain, Switzerland, Taiwan, and the U.K.) either do not exhibit the IBS effect at all, or only to a far smaller degree. In some cases, such as for the German DAX ETF, the effect is even inversed, with the top bucket showing the highest returns. As such, the IBS effect can be said to be a U.S.-centric phenomenon. The difference is illustrated with equity curves for each bucket for the U.S.-based and local ETFs in Figures 8 to 14. The reason(s) behind this are unclear, but this is problematic in terms of strategy implementation as trading in the local futures markets is not viable given the fact that the effect only shows up at the end of the U.S. session.

After 2008, a large part of the IBS effect for international ETFs depends on the IBS value of SPY: if the SPY IBS is low, shorting a high IBS international ETF will not work. The same relationship exists on the other side of the spectrum: if SPY IBS is high, going long a low IBS international ETF has significantly lower returns than it would otherwise provide. The actual mechanism of price discovery for international ETFs whose markets are closed in unclear, but it's fertile ground for statistical arbitrageurs. Levy & Lieberman (2013) suggest that country ETFs overreact to S&P 500 price changes during the hours when the foreign exchange is closed.

The Role of Range, Volume, Bull/Bear Markets, and Volatility

To investigate the relationship between the IBS effect and volatility, I calculate 20-day realized volatility for each day, then divide the sample into high volatility (above the median) and low volatility (below the median) days. Table 7 shows average volatility-adjusted close-to-close returns by IBS bucket, separated by volatility regime. It is clear that high volatility is related to increased predictability of returns and a more powerful IBS effect, in particular the high IBS-negative return aspect.

Range tends to be positively correlated with volatility, so I expect similar results. To test the importance of range, I construct a purely backwards-looking measure of relative range, by

comparing the day's range against the last 500 days' median range. A value at or above the median is considered a large range day, while a value below the median is considered a small range day. Table 8 contains average raw close-to-close returns by IBS bucket for high and low range days, while Table 9 shows the same returns with a volatility adjustment. As expected, the effect is larger after days with high range, both for high and low IBS extremes.

I also separate the set into bull and bear market environments, based on whether 200-day returns are positive or not. Table 10 contains average raw close-to-close returns by IBS bucket for high and low range days, while Table 11 shows the same returns with a volatility adjustment. The size of the effect is roughly similar in each environment (slightly larger in bear markets), but it is greater in the direction of the overall trend: high IBS readings are followed by larger negative returns during bear markets, and vice versa.

Volume also has some relation to volatility, but less so than range. The volume of the U.S.-based ETFs and the volume in their respective local markets are not necessarily well-correlated, which clearly shows in the results. Table 12 contains average raw close-to-close returns by IBS bucket for high and low volume days, while Table 13 shows the same returns with a volatility adjustment. close-to-close returns for foreign ETFs are virtually unchanged between the high and low volume categories. On the other hand, the difference is extremely important for the U.S. index ETFs: the IBS effect only appears to work on high-volume days. This may be a hint toward the source of the effect.

Day of the Week

Table 14 shows the 1st - 5th IBS bucket difference of average close-to-close returns, sorted by day of the week. The IBS effect is strongest on Monday (when average returns after), giving credence to the popular concept of "Turnaround Tuesday". Tuesday, Wednesday, and Thursday appear to behave similarly, while the the effect is by far the weakest on Fridays. The reasons behind this phenomenon are unclear; Mondays are not more volatile relative to other days.

Skewness

The mean of the returns distribution is not the only aspect that IBS can predict. Skewness also varies significantly between buckets, with low IBS readings being followed by highly skewed returns, and vice versa. As can be seen in Table 15, close-to-close returns after a bottom-bucket IBS day have skewness of 0.65, while top-bucket IBS days are followed by returns with skewness of 0.03.

IBS as Filter

The returns to an IBS-only strategy are both statistically and economically significant. Commissions will greatly decrease the returns and increase the maximum drawdowns, however, making such an approach unviable in the real world. One alternative is to combine the IBS effect with mean reversion on longer timescales and only take trades when they align. A simple

demonstration using the Cutler's RSI indicator will show how the IBS effect can be used to boost returns while significantly decreasing the number of trades needed.

Cutler's RSI at time t is calculated as follows:

$$U_t = \max(0, close_t - close_{t-1})$$

$$D_t = \min(0, close_t - close_{t-1})$$

$$RS_t(n) = \frac{{}^{1}\!/_{n} \sum_{i=0}^{n-1} U_{t-i}}{{}^{1}\!/_{n} \sum_{i=0}^{n-1} D_{t-i}}$$

if the denominator is zero, then $RS_t(n)$ is defined as 100.

$$\text{Cutler's } RSI_t(n) = \begin{cases} 100, & \text{if } \sum_{i=0}^{n-1} D_{t-i} = 0 \\ 100 - \frac{100}{1+RS_t(n)}, & \text{otherwise} \end{cases}$$

I test a simple, long-only strategy that uses the Cutler's RSI(3) indicator:

- Go long at the close if RSI(3) < 10
- Maintain the position while RSI(3) ≤ 40

I then filter these returns by adding an additional rule based on the value of IBS:

- Enter or maintain long position only if IBS ≤ 0.5

The results can be seen in Table 16. The IBS filter removes approximately 43% of the days that the RSI(3) system spends in market, while increasing total returns by 8% on average. Note that when the RSI and IBS strategies align, average close-to-close returns are higher than for either strategy alone. Figure 15 shows compounded equity curves illustrating the returns to the RSI(3) strategy and its filtered version, as applied to the QQQ ETF.

While such a strategy easily beats commissions, there are other constraints on using it at scale: the requirement of executing over a very small amount of time (near the end of the market closing) can be problematic in terms of price impact for large traders. There may even be behavioral factors constraining traders from exploiting this effect, such as a fear of "catching a falling knife". Institutional risk limits may also play a role by constraining the ability of traders to take directional positions.

It should be noted that these results indicate that daily mean reversion (as captured by the IBS effect) and medium-term mean reversion (as captured by the RSI strategy) are different phenomena which only partially overlap. The IBS filter can be used with similar results when combined with other mean reversion indicators, on longer timescales, with chart patterns, as well as with volatility-, breadth-, or seasonality-based trading strategies.

Conclusion

The results show that the IBS technical indicator is a strong and consistent predictor of close-to-close returns for equity ETFs trading in the U.S. Equity ETFs tend to mean revert on daily timescales; when the closing price is in the top of the day's range, close-to-close returns are lower, and vice versa. These results are generally not present in overseas markets, however.

The IBS effect is stronger during times of high volatility, after days with a large range, after days with high volume (for U.S. ETFs), during bear markets, and on Mondays. Additionally, it can not be explained by currency fluctuations. If one were to look for an explanation, the effect might be described in terms of intraday over-reaction which then reverts during the next day.

On average, a simple trading strategy exploiting the IBS effect has delivered an annual alpha of over 30%, before trading costs, over the last 19 years. The requirement of frequent trading would have eroded a large part of those returns, but the IBS effect can be used in combination with other trading strategies to enhance returns (and decrease the number of trades) beyond the point where commissions and slippage (for small orders) would have a significantly deleterious effect.

Further research into the IBS effect may be focused on the index constituents, or other asset classes.

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Tables

Table 1: ETF Ticker Symbols, Geographical Area, and Fund Names

Ticker	Country / Area	Fund Name
ECH	Chile	iShares MSCI Chile Investable Market Index Fund
EEM	Emerging Markets	iShares MSCI Emerging Markets Index Fund
EFA	EAFE	iShares MSCI EAFE Index Fund
EPHE	Philippines	iShares MSCI Philippines Investable Market Index Fund
EPI	India	WisdomTree India Earnings Fund
EPP	Pacific ex-Japan	iShares MSCI Pacific ex-Japan Index Fund
EWA	Australia	iShares MSCI Australia Index Fund
EWC	Canada	iShares MSCI Canada Index Fund
EWD	Sweden	iShares MSCI Sweden Index Fund
EWG	Germany	iShares MSCI Germany Index Fund
EWH	Hong Kong	iShares MSCI Hong Kong Index Fund
EWI	Italy	iShares MSCI Italy Index Fund
EWJ	Japan	iShares MSCI Japan Index Fund
EWL	Switzerland	iShares MSCI Switzerland Index Fund
EWM	Malaysia	iShares MSCI Malaysia Index Fund
EWO	Austria	iShares MSCI Austria Index Fund
EWP	Spain	iShares MSCI Spain Index Fund
EWQ	France	iShares MSCI France Index Fund
EWS	Singapore	iShares MSCI Singapore Index Fund
EWT	Taiwan	iShares MSCI Taiwan Index Fund
EWU	U.K.	iShares MSCI United Kingdom Index Fund
EWY	South Korea	iShares MSCI South Korea Index Fund
EWZ	Brazil	iShares MSCI Brazil Index Fund
EZA	South Africa	iShares MSCI South Africa Index Fund
FXI	China	iShares FTSE China 25 Index Fund
GXG	Colombia	Global X FTSE Colombia 20 ETF
IDX	Indonesia	Market Vectors® Indonesia Index ETF
ILF	Latin America	iShares S&P Latin America 40 Index Fund
IWM	U.S.	iShares Russell 2000 Index Fund
QQQ	U.S.	Powershares QQQ
RSX	Russia	Market Vectors® Russia ETF
SPY	U.S.	SPDR S&P 500 ETF
THD	Thailand	iShares MSCI Thailand Index Fund

Table 2: Descriptive Statistics of Daily Returns

Ticker	Mean	St. Dev.	Skewness	Min.	Max.	% Days Up	Obs.	Beginning	End
ECH	0.045%	1.928%	-0.07	-12.080%	15.681%	53.27%	1286	20/11/2007	31/12/2012
EEM	0.085%	2.162%	0.66	-16.161%	22.798%	53.54%	2445	15/4/2003	31/12/2012
EFA	0.031%	1.562%	0.24	-11.164%	15.882%	52.73%	2852	27/8/2001	31/12/2012
EPHE	0.070%	1.361%	-0.08	-5.425%	4.643%	52.03%	567	29/9/2010	31/12/2012
EPI	0.010%	2.530%	0.72	-11.189%	23.469%	50.37%	1221	26/2/2008	31/12/2012
EPP	0.065%	1.732%	0.24	-11.228%	16.591%	52.40%	2813	26/10/2001	31/12/2012
EWA	0.053%	1.834%	0.13	-12.346%	20.668%	48.89%	4216	1/4/1996	31/12/2012
EWC	0.049%	1.559%	-0.30	-10.999%	12.384%	49.10%	4216	1/4/1996	31/12/2012
EWD	0.058%	2.176%	0.04	-13.707%	13.309%	49.15%	4216	1/4/1996	31/12/2012
EWG	0.038%	1.805%	0.21	-11.321%	19.784%	50.19%	4216	1/4/1996	31/12/2012
EWH	0.040%	2.040%	0.59	-12.406%	20.362%	47.94%	4216	1/4/1996	31/12/2012
EWI	0.034%	1.851%	0.04	-10.569%	15.320%	50.05%	4216	1/4/1996	31/12/2012
EWJ	0.007%	1.632%	0.51	-10.472%	15.782%	47.01%	4216	1/4/1996	31/12/2012
EWL	0.036%	1.520%	-0.08	-8.228%	11.802%	48.32%	4216	1/4/1996	31/12/2012
EWM	0.037%	2.120%	0.81	-12.386%	19.113%	45.54%	4216	1/4/1996	31/12/2012
EWO	0.038%	1.821%	-0.22	-12.680%	16.387%	46.82%	4216	1/4/1996	31/12/2012
EWP	0.049%	1.861%	0.10	-11.056%	14.560%	49.55%	4216	1/4/1996	31/12/2012
EWQ	0.038%	1.743%	0.03	-10.941%	13.060%	49.64%	4216	1/4/1996	31/12/2012
EWS	0.033%	2.063%	0.42	-11.568%	17.964%	47.39%	4216	1/4/1996	31/12/2012
EWT	0.021%	2.174%	0.14	-11.645%	14.182%	48.98%	3148	23/6/2000	31/12/2012
EWU	0.033%	1.599%	0.07	-11.992%	17.053%	49.10%	4216	1/4/1996	31/12/2012
EWY	0.070%	2.479%	0.46	-16.496%	22.429%	52.34%	3177	12/5/2000	31/12/2012
EWZ	0.079%	2.578%	0.02	-19.633%	25.562%	51.82%	3134	14/7/2000	31/12/2012
EZA	0.093%	2.336%	0.10	-20.072%	22.906%	54.35%	2416	28/5/2003	31/12/2012
FXI	0.078%	2.551%	0.57	-14.834%	20.261%	52.01%	2069	12/10/2004	31/12/2012
GXG	0.127%	1.507%	-0.10	-6.266%	7.404%	51.53%	980	9/2/2009	31/12/2012
IDX	0.157%	2.138%	0.26	-10.321%	10.663%	51.81%	994	20/1/2009	31/12/2012
ILF	0.102%	2.257%	0.29	-19.479%	26.246%	54.26%	2431	6/5/2003	31/12/2012
IWM	0.038%	1.650%	-0.11	-11.237%	8.631%	52.32%	3167	26/5/2000	31/12/2012
QQQ	0.029%	2.002%	0.35	-8.976%	16.852%	52.66%	3475	10/3/1999	31/12/2012
RSX	0.043%	3.370%	0.09	-22.362%	23.002%	51.26%	1424	7/5/2007	31/12/2012
SPY	0.038%	1.239%	0.13	-9.838%	14.523%	53.20%	5017	29/1/1993	31/12/2012
THD	0.075%	2.236%	-0.04	-11.666%	15.476%	54.64%	1197	1/4/2008	31/12/2012
Average	0.054%	1.982%	0.19	-12.447%	16.811%	50.73%	3116	-	-

Table 3: Close-to-Close returns by IBS Bucket

Bold values indicate that the returns for that bucket are significantly higher (1st and 2nd buckets), or lower (4th and 5th buckets) from the average day at the 1% level.

	Buckets					
Ticker	1st	2nd	3rd	4th	5th	1st-5th
ECH	0.283%	-0.293%	-0.133%	0.021%	0.182%	0.100%
EEM	**0.472%**	0.114%	0.001%	-0.185%	-0.003%	**0.475%**
EFA	**0.277%**	0.091%	-0.030%	-0.004%	-0.107%	**0.385%**
EPHE	**0.519%**	0.115%	-0.075%	0.078%	-0.159%	**0.678%**
EPI	0.521%	0.280%	-0.092%	-0.147%	**-0.348%**	**0.869%**
EPP	0.256%	0.173%	0.100%	-0.045%	-0.070%	**0.326%**
EWA	**0.517%**	0.176%	0.069%	0.046%	**-0.307%**	**0.825%**
EWC	**0.205%**	0.015%	0.130%	-0.052%	-0.058%	**0.263%**
EWD	**0.394%**	-0.063%	0.091%	0.013%	**-0.180%**	**0.575%**
EWG	**0.314%**	0.008%	0.064%	-0.023%	**-0.119%**	**0.433%**
EWH	**0.537%**	0.199%	-0.001%	-0.091%	**-0.348%**	**0.885%**
EWI	**0.355%**	0.071%	0.094%	-0.054%	**-0.226%**	**0.580%**
EWJ	**0.455%**	0.047%	0.102%	-0.119%	**-0.306%**	**0.761%**
EWL	**0.506%**	**0.234%**	0.094%	**-0.188%**	**-0.280%**	**0.787%**
EWM	**0.336%**	0.233%	0.169%	-0.124%	**-0.320%**	**0.656%**
EWO	**0.342%**	0.179%	0.238%	**-0.207%**	**-0.185%**	**0.527%**
EWP	**0.351%**	0.166%	0.053%	-0.027%	**-0.211%**	**0.563%**
EWQ	**0.278%**	0.116%	-0.002%	-0.080%	**-0.115%**	**0.394%**
EWS	**0.545%**	**0.335%**	-0.125%	-0.097%	**-0.382%**	**0.928%**
EWT	**0.499%**	0.211%	-0.064%	0.011%	**-0.370%**	**0.869%**
EWU	**0.365%**	0.171%	0.104%	-0.087%	**-0.221%**	**0.586%**
EWY	**0.479%**	0.113%	0.133%	-0.110%	**-0.192%**	**0.671%**
EWZ	0.178%	0.026%	-0.091%	0.206%	0.056%	0.123%
EZA	**0.540%**	0.059%	0.104%	-0.102%	-0.078%	**0.619%**
FXI	**0.604%**	0.255%	0.018%	-0.162%	-0.172%	**0.777%**
GXG	0.127%	0.135%	0.143%	0.013%	0.131%	-0.004%
IDX	0.385%	0.095%	0.106%	0.100%	0.102%	0.283%
ILF	0.203%	-0.167%	-0.001%	0.118%	0.184%	0.020%
IWM	**0.253%**	0.002%	-0.055%	-0.054%	-0.012%	**0.265%**
QQQ	**0.252%**	0.123%	0.039%	-0.159%	-0.086%	**0.338%**
RSX	0.435%	-0.050%	-0.277%	0.342%	-0.174%	**0.608%**
SPY	**0.173%**	-0.014%	0.050%	0.022%	-0.028%	**0.201%**
THD	**0.628%**	0.136%	0.078%	-0.173%	-0.145%	**0.773%**
Average	0.381%	0.100%	0.031%	-0.040%	-0.138%	0.519%

Table 4: Next-Day Probability of an Up Day by IBS bucket

Bold values indicate that the difference between the top and bottom buckets is statistically significantly different from 0 at the 1% confidence level.

	Buckets					
Ticker	1st	2nd	3rd	4th	5th	1st-5th
ECH	53.65%	45.63%	46.53%	52.84%	60.61%	-6.96%
EEM	60.46%	54.44%	53.93%	47.87%	51.28%	**9.18%**
EFA	56.99%	56.80%	50.66%	51.22%	49.76%	**7.23%**
EPHE	65.00%	55.91%	44.32%	55.05%	45.00%	**20.00%**
EPI	58.97%	51.18%	50.24%	49.10%	44.28%	**14.70%**
EPP	56.44%	53.92%	55.34%	52.07%	48.26%	**8.18%**
EWA	59.33%	53.42%	52.69%	51.65%	39.09%	**20.24%**
EWC	53.57%	53.47%	52.89%	47.76%	45.76%	**7.80%**
EWD	54.93%	50.56%	51.76%	51.24%	43.92%	**11.01%**
EWG	55.76%	52.41%	50.32%	51.50%	45.22%	**10.53%**
EWH	57.02%	54.39%	48.09%	47.13%	37.31%	**19.71%**
EWI	56.90%	52.45%	52.62%	48.45%	43.48%	**13.42%**
EWJ	59.54%	48.95%	48.28%	45.89%	37.23%	**22.31%**
EWL	61.59%	56.90%	50.37%	46.83%	37.49%	**24.10%**
EWM	53.59%	52.12%	47.86%	43.11%	35.25%	**18.34%**
EWO	55.25%	55.76%	56.50%	47.95%	42.71%	**12.53%**
EWP	56.64%	54.80%	51.32%	47.99%	44.87%	**11.77%**
EWQ	55.69%	52.60%	50.36%	49.75%	43.95%	**11.74%**
EWS	58.61%	54.10%	45.41%	44.60%	37.42%	**21.19%**
EWT	57.65%	51.45%	50.92%	47.55%	41.26%	**16.39%**
EWU	57.73%	56.21%	50.93%	47.03%	41.43%	**16.30%**
EWY	57.65%	52.45%	54.69%	50.00%	47.98%	**9.67%**
EWZ	53.94%	50.94%	48.53%	53.17%	52.95%	0.99%
EZA	62.19%	51.93%	55.46%	49.18%	52.50%	**9.69%**
FXI	57.95%	54.84%	49.40%	49.21%	49.09%	**8.86%**
GXG	52.07%	46.85%	55.94%	52.32%	50.74%	1.34%
IDX	57.87%	50.36%	50.00%	50.84%	49.66%	8.21%
ILF	55.34%	49.58%	50.16%	53.75%	57.09%	-1.75%
IWM	54.29%	53.63%	52.09%	50.00%	51.60%	2.69%
QQQ	55.79%	54.91%	53.58%	48.35%	51.61%	4.18%
RSX	59.26%	52.50%	47.66%	52.67%	45.37%	**13.89%**
SPY	57.67%	53.83%	53.64%	51.11%	50.50%	**7.17%**
THD	65.22%	53.01%	57.79%	48.32%	50.14%	**15.07%**
Average	57.41%	52.80%	51.22%	49.56%	46.21%	11.20%

Table 5: Difference of Average Close-to-Close Returns Between Top and Bottom IBS_n Buckets for Different Values of n

	MA Length							
Ticker	1	2	3	4	5	6	7	8
ECH	0.01%	0.00%	0.21%	0.55%	0.45%	0.43%	0.69%	1.77%
EEM	0.43%	0.57%	0.38%	0.58%	0.68%	0.61%	0.86%	0.49%
EFA	0.33%	0.30%	0.33%	0.42%	0.50%	0.32%	1.55%	0.13%
EPHE	0.61%	0.86%	0.74%	0.60%	1.51%	0.56%	0.27%	0.88%
EPI	0.82%	0.27%	0.61%	0.42%	0.51%	0.50%	0.44%	0.19%
EPP	0.31%	0.28%	0.01%	0.13%	0.36%	0.05%	-0.03%	0.24%
EWA	0.76%	0.78%	0.75%	0.69%	0.65%	0.66%	0.55%	0.57%
EWC	0.24%	0.30%	0.39%	0.38%	0.49%	0.68%	0.40%	0.63%
EWD	0.55%	0.48%	0.29%	0.52%	0.47%	0.50%	0.63%	0.68%
EWG	0.41%	0.30%	0.46%	0.52%	0.27%	0.56%	0.48%	0.39%
EWH	0.79%	0.78%	0.58%	0.70%	1.05%	0.84%	1.42%	1.24%
EWI	0.54%	0.44%	0.48%	0.39%	0.36%	0.46%	0.74%	0.46%
EWJ	0.67%	0.59%	0.59%	0.86%	0.68%	0.70%	0.37%	0.58%
EWL	0.79%	0.66%	0.61%	0.65%	0.54%	0.72%	0.64%	0.74%
EWM	0.61%	0.50%	0.34%	0.36%	0.33%	0.62%	0.75%	0.60%
EWO	0.58%	0.52%	0.37%	0.48%	0.58%	0.53%	0.86%	0.56%
EWP	0.49%	0.52%	0.62%	0.80%	0.68%	0.86%	1.13%	0.87%
EWQ	0.36%	0.37%	0.36%	0.54%	0.57%	0.55%	0.87%	0.65%
EWS	0.86%	0.85%	0.72%	0.42%	0.62%	0.43%	0.71%	0.50%
EWT	0.73%	0.81%	0.80%	0.54%	0.70%	0.38%	0.37%	0.08%
EWU	0.52%	0.55%	0.47%	0.51%	0.51%	0.40%	0.56%	0.57%
EWY	0.63%	0.62%	0.54%	0.71%	0.91%	0.82%	0.59%	0.12%
EWZ	0.06%	0.11%	-0.13%	0.10%	-0.03%	0.20%	0.08%	0.12%
EZA	0.52%	0.46%	0.55%	0.93%	1.19%	0.74%	0.60%	0.77%
FXI	0.75%	0.74%	0.86%	1.14%	1.26%	1.07%	1.60%	1.73%
GXG	0.00%	0.12%	0.02%	-0.11%	0.39%	0.28%	0.39%	0.76%
IDX	0.31%	0.18%	0.50%	0.41%	0.10%	0.12%	1.00%	0.74%
ILF	-0.05%	0.03%	0.36%	0.47%	0.76%	0.67%	0.21%	0.67%
IWM	0.21%	0.38%	0.46%	0.55%	0.33%	0.89%	0.49%	0.60%
QQQ	0.34%	0.54%	0.76%	0.33%	0.68%	0.86%	0.60%	0.62%
RSX	0.28%	0.21%	0.65%	0.83%	0.95%	1.50%	1.67%	4.71%
SPY	0.15%	0.22%	0.44%	0.47%	0.47%	0.71%	1.09%	0.91%
THD	0.56%	0.57%	0.53%	0.73%	0.47%	1.24%	2.36%	2.64%
Average	0.46%	0.45%	0.47%	0.53%	0.61%	0.62%	0.76%	0.82%

Table 6: Returns to Long/Short IBS Strategy by Year

	Year																			
Ticker	'93	'94	'95	'96	'97	'98	'99	'00	'01	'02	'03	'04	'05	'06	'07	'08	'09	'10	'11	'12	Average
ECH	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-8.35%	37.98%	-11.02%	-11.95%	4.22%	-2.58%	1.38%
EEM	-	-	-	-	-	-	-	-	-	-	-13.92%	11.18%	6.41%	18.82%	24.68%	110.56%	25.99%	28.81%	39.29%	-0.76%	25.11%
EFA	-	-	-	-	-	-	-	-	-6.99%	17.57%	12.52%	27.06%	5.58%	6.39%	7.03%	47.53%	37.76%	39.84%	46.31%	1.66%	20.19%
EPHE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20.19%	48.50%	10.40%	26.36%
EPI	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	111.37%	99.56%	25.61%	31.12%	-27.19%	48.09%
EPP	-	-	-	-	-	-	-	-	3.11%	30.27%	12.77%	20.15%	-1.45%	3.12%	31.85%	54.55%	24.37%	19.88%	13.98%	0.86%	17.79%
EWA	-	-	-	54.26%	69.17%	95.32%	127.05%	149.11%	71.69%	105.46%	22.60%	6.72%	0.26%	5.51%	38.24%	49.75%	57.58%	32.25%	24.65%	6.24%	53.87%
EWC	-	-	-	22.71%	40.46%	1.85%	68.44%	-18.32%	66.62%	93.12%	35.11%	19.42%	-18.88%	7.41%	16.87%	-8.31%	-5.33%	10.86%	-14.63%	-16.36%	17.71%
EWD	-	-	-	24.06%	38.50%	81.37%	60.63%	68.84%	39.95%	73.75%	43.07%	22.33%	20.68%	10.25%	37.50%	66.92%	14.01%	59.73%	51.81%	-3.11%	41.78%
EWG	-	-	-	18.27%	52.15%	42.97%	46.34%	-6.45%	25.58%	22.97%	35.54%	36.38%	14.42%	3.71%	18.99%	38.81%	49.19%	37.41%	18.87%	-15.65%	25.85%
EWH	-	-	-	24.49%	73.86%	17.11%	57.41%	38.17%	79.50%	56.09%	52.64%	36.97%	30.28%	36.36%	50.56%	182.85%	43.81%	28.11%	20.01%	-9.60%	48.15%
EWI	-	-	-	22.22%	3.64%	-2.71%	40.76%	62.94%	60.51%	77.07%	32.15%	31.12%	10.51%	28.57%	56.16%	80.09%	63.30%	49.11%	54.68%	29.60%	41.16%
EWJ	-	-	-	26.45%	70.22%	21.97%	44.86%	56.29%	53.26%	82.06%	18.56%	18.73%	24.41%	27.38%	17.94%	97.82%	47.62%	24.03%	53.34%	14.52%	41.14%
EWL	-	-	-	16.18%	56.67%	107.91%	112.81%	88.03%	62.09%	70.71%	77.49%	37.99%	14.56%	15.41%	33.46%	25.40%	59.08%	55.81%	22.22%	1.92%	50.46%
EWM	-	-	-	33.19%	63.60%	130.44%	3.04%	21.76%	67.42%	47.51%	35.01%	33.67%	22.88%	18.57%	45.08%	113.64%	44.87%	-3.63%	35.01%	8.28%	42.37%
EWO	-	-	-	7.65%	5.64%	44.04%	86.00%	56.79%	50.31%	91.26%	56.56%	11.31%	8.99%	0.47%	31.75%	2.55%	12.37%	35.40%	10.30%	22.13%	31.38%
EWP	-	-	-	21.70%	32.46%	23.58%	124.86%	45.94%	34.40%	84.20%	57.61%	10.21%	11.41%	-7.49%	22.11%	70.91%	26.65%	54.98%	44.68%	31.21%	40.56%
EWQ	-	-	-	15.90%	34.61%	19.24%	53.36%	-1.94%	44.65%	3.25%	6.32%	32.98%	26.30%	18.81%	21.42%	54.58%	39.67%	41.36%	38.68%	3.28%	26.62%
EWS	-	-	-	33.28%	137.39%	93.08%	50.06%	47.07%	76.89%	127.52%	96.06%	37.64%	17.88%	9.54%	32.41%	100.15%	42.11%	-0.52%	10.06%	-4.99%	53.27%
EWT	-	-	-	-	-	-	-	17.14%	61.99%	66.27%	84.87%	72.86%	17.68%	42.47%	46.52%	85.11%	44.12%	3.83%	31.97%	15.53%	45.41%
EWU	-	-	-	43.37%	59.83%	66.08%	61.60%	72.67%	31.63%	36.74%	32.35%	29.97%	20.80%	18.63%	23.77%	35.26%	27.67%	27.72%	16.83%	3.31%	35.78%
EWY	-	-	-	-	-	-	-	63.90%	89.86%	75.47%	51.68%	25.47%	9.58%	16.38%	28.96%	60.41%	11.54%	22.91%	40.94%	-8.58%	37.58%
EWZ	-	-	-	-	-	-	-	-6.22%	5.58%	38.23%	-26.95%	-21.48%	-31.65%	-7.57%	21.38%	53.22%	24.97%	-4.51%	9.46%	2.88%	4.41%
EZA	-	-	-	-	-	-	-	-	-	-	-6.86%	-23.28%	-4.13%	24.47%	59.08%	144.00%	29.03%	63.95%	49.05%	-0.48%	33.49%
FXI	-	-	-	-	-	-	-	-	-	-	-	2.75%	-3.44%	-9.35%	45.35%	205.90%	23.77%	35.32%	32.59%	-0.76%	36.90%
GXG	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	19.80%	15.39%	-10.06%	-15.61%	2.38%
IDX	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	26.27%	30.55%	10.73%	-20.21%	11.83%
ILF	-	-	-	-	-	-	-	-	-	-	-30.56%	-40.68%	-31.67%	-1.44%	-0.92%	42.50%	4.17%	10.64%	7.71%	-7.78%	-4.80%
IWM	-	-	-	-	-	-	-	17.11%	-3.86%	42.30%	-10.43%	5.60%	-17.44%	9.34%	28.45%	63.36%	18.14%	19.49%	31.73%	-14.71%	14.54%
QQQ	-	-	-	-	-	-	6.09%	54.31%	32.97%	29.20%	39.78%	20.38%	-1.73%	-7.63%	6.55%	48.57%	8.20%	22.52%	19.18%	-8.38%	19.29%
RSX	-	-	-	-	-	-	-	-	-	-	-	-	-	-	24.12%	109.46%	13.68%	8.79%	28.70%	9.73%	32.41%
SPY	5.87%	-1.70%	-4.32%	2.57%	12.01%	23.77%	-7.81%	16.71%	5.94%	12.83%	9.63%	9.37%	8.92%	3.05%	19.93%	69.99%	21.62%	10.75%	7.46%	-9.83%	10.84%
THD	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	56.08%	72.88%	23.63%	44.40%	1.89%	39.77%
Average	5.87%	-1.70%	-4.32%	24.42%	50.01%	51.07%	58.47%	42.19%	43.32%	58.36%	28.94%	18.26%	6.20%	11.20%	27.89%	73.70%	31.80%	25.40%	26.48%	-0.10%	31.59%

Table 7: Volatility-Sorted, Volatility-Adjusted Close-to-Close Returns By IBS bucket

High volatility days are days when the 20-day realized volatility is above the sample median, and vice versa. Returns are adjusted by the 10-day realized volatility. Bold values indicate that the returns of that bucket are statistically significantly greater (bottom bucket), or smaller (top bucket) than the average daily return, at the 1% confidence level. Bold values in the 1st - 5th columns indicate that the returns in the bottom and top buckets are significantly different at the 1% level.

	High Volatility			Low Volatility		
Ticker	1st	5th	1st-5th	1st	5th	1st-5th
ECH	0.082	0.120	-0.038	-0.027	0.130	-0.157
EEM	**0.237**	0.001	**0.237**	0.150	0.145	0.005
EFA	**0.136**	-0.072	**0.208**	0.212	-0.019	**0.231**
EPHE	**0.352**	-0.088	**0.440**	0.259	0.031	0.228
EPI	**0.162**	**-0.191**	**0.353**	0.065	-0.026	0.092
EPP	0.134	-0.060	**0.193**	0.162	0.029	0.133
EWA	**0.337**	**-0.256**	**0.593**	**0.216**	**-0.062**	**0.278**
EWC	0.127	-0.049	**0.176**	**0.207**	0.012	**0.194**
EWD	**0.154**	**-0.103**	**0.257**	**0.224**	-0.024	**0.248**
EWG	**0.187**	**-0.087**	**0.274**	**0.201**	-0.022	**0.222**
EWH	**0.226**	**-0.205**	**0.431**	**0.291**	**-0.157**	**0.448**
EWI	**0.161**	**-0.142**	**0.303**	**0.242**	**-0.101**	**0.343**
EWJ	**0.304**	**-0.232**	**0.536**	**0.207**	**-0.129**	**0.336**
EWL	**0.358**	**-0.231**	**0.589**	**0.283**	**-0.108**	**0.391**
EWM	**0.174**	**-0.216**	**0.390**	**0.268**	**-0.124**	**0.392**
EWO	**0.174**	**-0.170**	**0.344**	**0.250**	0.014	**0.237**
EWP	**0.185**	**-0.110**	**0.295**	**0.232**	**-0.093**	**0.325**
EWQ	0.106	**-0.083**	**0.190**	**0.283**	-0.061	**0.343**
EWS	**0.285**	**-0.241**	**0.526**	**0.209**	**-0.085**	**0.294**
EWT	**0.210**	**-0.168**	**0.378**	**0.270**	**-0.115**	**0.385**
EWU	**0.222**	**-0.164**	**0.386**	**0.272**	**-0.081**	**0.353**
EWY	**0.165**	**-0.153**	**0.318**	**0.268**	0.053	**0.216**
EWZ	0.060	0.017	0.043	0.066	0.128	-0.062
EZA	**0.221**	**-0.014**	**0.235**	0.192	0.107	0.085
FXI	**0.221**	**-0.053**	**0.273**	0.186	0.048	0.138
GXG	0.120	0.080	0.040	-0.028	0.161	-0.189
IDX	0.185	0.055	0.130	0.151	0.037	0.115
ILF	0.104	0.140	-0.036	0.003	0.212	-0.208
IWM	**0.159**	-0.045	**0.204**	0.004	0.101	-0.097
QQQ	**0.147**	-0.059	**0.206**	0.088	0.053	0.035
RSX	0.093	-0.028	0.121	0.202	-0.026	0.228
SPY	**0.150**	-0.002	**0.152**	0.139	0.049	0.090
THD	**0.260**	-0.089	**0.349**	0.317	0.126	0.192
Average	0.188	-0.088	0.276	0.184	0.006	0.178

Table 8: Range-Sorted Close-to-Close Returns By IBS bucket

High range days are days whose range was higher than the 500-day median range, and vice versa. Bold values indicate that the returns of that bucket are statistically significantly greater (bottom bucket), or smaller (top bucket) than the average daily return, at the 1% confidence level. Bold values in the 1st - 5th columns indicate that the returns in the bottom and top buckets are significantly different at the 1% level.

	High Range			Low Range		
Ticker	1st	5th	1st-5th	1st	5th	1st-5th
ECH	0.042%	0.045%	-0.003%	**0.604%**	0.299%	0.304%
EEM	0.349%	-0.076%	**0.425%**	**0.678%**	0.070%	**0.609%**
EFA	0.303%	-0.170%	**0.474%**	0.242%	-0.051%	**0.293%**
EPHE	**0.550%**	-0.175%	**0.724%**	0.459%	-0.137%	0.596%
EPI	0.683%	-0.532%	**1.214%**	0.374%	-0.261%	0.635%
EPP	0.280%	-0.060%	**0.341%**	0.208%	-0.086%	0.294%
EWA	**0.565%**	**-0.436%**	**1.002%**	**0.452%**	**-0.151%**	**0.603%**
EWC	0.184%	-0.083%	**0.268%**	0.244%	-0.018%	**0.262%**
EWD	**0.439%**	**-0.192%**	**0.631%**	**0.322%**	-0.161%	**0.483%**
EWG	**0.346%**	**-0.146%**	**0.492%**	**0.264%**	-0.085%	**0.349%**
EWH	**0.732%**	**-0.447%**	**1.179%**	**0.312%**	**-0.246%**	**0.558%**
EWI	**0.476%**	**-0.246%**	**0.722%**	0.199%	**-0.206%**	**0.405%**
EWJ	**0.491%**	**-0.483%**	**0.974%**	**0.421%**	**-0.171%**	**0.592%**
EWL	**0.554%**	**-0.347%**	**0.901%**	**0.444%**	**-0.202%**	**0.646%**
EWM	**0.521%**	**-0.443%**	**0.964%**	0.206%	**-0.227%**	**0.434%**
EWO	**0.366%**	**-0.273%**	**0.639%**	0.289%	-0.018%	**0.307%**
EWP	**0.427%**	**-0.178%**	**0.605%**	0.243%	**-0.259%**	**0.502%**
EWQ	**0.356%**	-0.113%	**0.469%**	0.165%	**-0.118%**	**0.282%**
EWS	**0.695%**	**-0.557%**	**1.252%**	**0.424%**	**-0.245%**	**0.669%**
EWT	**0.451%**	**-0.572%**	**1.023%**	**0.552%**	-0.162%	**0.714%**
EWU	**0.501%**	**-0.318%**	**0.819%**	0.173%	**-0.114%**	**0.288%**
EWY	**0.543%**	**-0.234%**	**0.777%**	0.378%	-0.142%	**0.519%**
EWZ	0.176%	0.008%	0.168%	0.184%	0.158%	0.025%
EZA	**0.597%**	-0.100%	**0.697%**	0.421%	-0.041%	0.462%
FXI	**0.603%**	-0.124%	**0.727%**	0.606%	-0.234%	**0.840%**
GXG	0.093%	0.080%	0.014%	0.144%	0.175%	-0.031%
IDX	**0.868%**	0.123%	0.746%	-0.160%	0.084%	-0.244%
ILF	0.172%	0.160%	0.011%	0.252%	0.213%	0.040%
IWM	**0.373%**	-0.078%	**0.452%**	0.057%	0.063%	-0.006%
QQQ	**0.350%**	-0.130%	**0.480%**	0.128%	-0.049%	0.177%
RSX	0.730%	-0.543%	**1.272%**	0.058%	0.122%	-0.064%
SPY	**0.195%**	-0.020%	**0.215%**	0.126%	-0.036%	**0.162%**
THD	0.515%	**-0.336%**	**0.851%**	**0.851%**	0.051%	**0.800%**
Average	0.440%	-0.212%	0.652%	0.313%	-0.066%	0.379%

Table 9: Range-Sorted, Volatility-Adjusted Close-to-Close Returns By IBS bucket

High range days are days whose range was higher than the 500-day median range, and vice versa. Returns are adjusted by the 10-day realized volatility. Bold values indicate that the returns of that bucket are statistically significantly greater (bottom bucket), or smaller (top bucket) than the average daily return, at the 1% confidence level. Bold values in the 1st - 5th columns indicate that the returns in the bottom and top buckets are significantly different at the 1% level.

	High Range			Low Range		
Ticker	1st	5th	1st-5th	1st	5th	1st-5th
ECH	-0.045	0.079	-0.123	**0.243**	0.144	0.099
EEM	0.156	0.005	**0.151**	**0.276**	0.116	**0.160**
EFA	0.172	-0.070	**0.242**	0.238	-0.070	**0.308**
EPHE	**0.415**	-0.037	**0.453**	0.244	-0.090	0.334
EPI	0.300	-0.100	**0.400**	0.063	-0.111	0.174
EPP	0.167	-0.030	**0.197**	0.124	-0.044	0.168
EWA	**0.309**	**-0.270**	**0.579**	**0.312**	**-0.126**	**0.438**
EWC	0.141	-0.048	**0.190**	0.236	-0.039	**0.275**
EWD	**0.236**	**-0.074**	**0.310**	**0.179**	-0.087	**0.265**
EWG	**0.213**	**-0.089**	**0.302**	**0.248**	-0.061	**0.309**
EWH	**0.361**	**-0.211**	**0.572**	**0.231**	**-0.202**	**0.433**
EWI	**0.293**	**-0.173**	**0.466**	0.145	**-0.155**	**0.300**
EWJ	**0.298**	**-0.296**	**0.594**	**0.323**	**-0.164**	**0.487**
EWL	**0.368**	**-0.249**	**0.617**	**0.366**	**-0.164**	**0.530**
EWM	**0.321**	**-0.240**	**0.561**	0.177	**-0.146**	**0.323**
EWO	**0.258**	**-0.147**	**0.405**	0.204	-0.052	**0.256**
EWP	**0.255**	**-0.085**	**0.340**	0.183	**-0.192**	**0.374**
EWQ	**0.243**	-0.074	**0.316**	0.147	**-0.128**	**0.275**
EWS	**0.346**	**-0.231**	**0.576**	**0.250**	**-0.138**	**0.389**
EWT	**0.224**	**-0.248**	**0.472**	**0.308**	-0.105	**0.412**
EWU	**0.349**	**-0.219**	**0.568**	0.178	**-0.111**	**0.289**
EWY	**0.223**	**-0.095**	**0.319**	0.196	-0.063	**0.259**
EWZ	0.067	0.029	0.037	0.072	0.081	-0.009
EZA	**0.270**	0.024	**0.247**	0.135	0.055	0.079
FXI	**0.197**	0.028	**0.169**	0.263	-0.068	**0.331**
GXG	0.086	0.044	0.042	0.047	0.193	-0.146
IDX	**0.417**	-0.006	0.423	-0.038	0.091	-0.129
ILF	0.047	0.139	-0.092	0.048	0.197	-0.149
IWM	**0.179**	-0.015	**0.194**	0.011	0.022	-0.011
QQQ	**0.165**	-0.077	**0.241**	0.125	0.019	0.105
RSX	0.261	-0.093	**0.354**	-0.019	0.017	-0.036
SPY	**0.163**	0.025	**0.138**	0.141	-0.015	**0.156**
THD	0.271	**-0.088**	**0.359**	**0.425**	0.060	**0.365**
Average	0.234	-0.088	0.322	0.184	-0.040	0.225

Table 10: Bull-/Bear- Market-Sorted Close-to-Close Returns By IBS bucket

Bull market days are defined as days which, at the close, have positive or zero 200-day return (including dividends), and vice versa. Bold values indicate that the returns of that bucket are statistically significantly greater (bottom bucket), or smaller (top bucket) than the average daily return, at the 1% confidence level. Note that despite greater means during bear markets, it is more difficult to establish statistical significance due to smaller sample sizes and higher variance. Bold values in the 1st - 5th columns indicate that the returns in the bottom and top buckets are significantly different at the 1% level.

	Bear			Bull		
Ticker	1st	5th	1st-5th	1st	5th	1st-5th
ECH	0.532%	0.179%	0.353%	0.070%	0.185%	-0.115%
EEM	**0.989%**	-0.348%	**1.337%**	**0.317%**	0.080%	**0.237%**
EFA	**0.403%**	-0.184%	**0.587%**	0.176%	-0.060%	**0.236%**
EPHE	**0.668%**	-0.207%	**0.875%**	0.442%	-0.130%	**0.572%**
EPI	0.618%	**-0.507%**	**1.125%**	0.343%	-0.113%	0.455%
EPP	0.498%	-0.120%	0.619%	0.150%	-0.053%	**0.203%**
EWA	**0.738%**	**-0.373%**	**1.111%**	**0.316%**	**-0.275%**	**0.591%**
EWC	0.306%	-0.092%	**0.398%**	0.150%	-0.043%	**0.193%**
EWD	**0.492%**	**-0.371%**	**0.863%**	**0.326%**	**-0.085%**	**0.411%**
EWG	0.318%	**-0.261%**	**0.579%**	**0.311%**	-0.056%	**0.367%**
EWH	**0.640%**	**-0.468%**	**1.109%**	**0.456%**	**-0.276%**	**0.731%**
EWI	**0.558%**	**-0.425%**	**0.983%**	**0.214%**	**-0.109%**	**0.324%**
EWJ	**0.523%**	**-0.424%**	**0.946%**	**0.354%**	**-0.178%**	**0.532%**
EWL	**0.613%**	**-0.323%**	**0.936%**	**0.424%**	**-0.255%**	**0.679%**
EWM	**0.359%**	**-0.607%**	**0.966%**	**0.319%**	**-0.184%**	**0.503%**
EWO	**0.359%**	**-0.301%**	**0.659%**	**0.329%**	**-0.110%**	**0.439%**
EWP	**0.457%**	**-0.352%**	**0.810%**	**0.274%**	**-0.135%**	**0.410%**
EWQ	**0.360%**	-0.183%	**0.543%**	**0.230%**	**-0.083%**	**0.313%**
EWS	**0.560%**	**-0.638%**	**1.198%**	**0.526%**	**-0.162%**	**0.688%**
EWT	**0.648%**	**-0.453%**	**1.102%**	**0.361%**	**-0.297%**	**0.658%**
EWU	**0.365%**	**-0.302%**	**0.668%**	**0.365%**	**-0.183%**	**0.548%**
EWY	**0.622%**	-0.192%	**0.814%**	**0.382%**	**-0.193%**	**0.575%**
EWZ	0.153%	-0.144%	0.296%	0.203%	0.175%	0.028%
EZA	0.945%	-0.264%	**1.208%**	**0.386%**	-0.026%	**0.412%**
FXI	0.864%	-0.486%	**1.351%**	**0.448%**	-0.035%	**0.483%**
GXG	0.174%	0.117%	0.057%	0.118%	0.133%	-0.015%
IDX	0.180%	0.208%	-0.029%	0.463%	0.072%	0.391%
ILF	0.513%	0.014%	0.499%	0.097%	0.228%	-0.131%
IWM	**0.636%**	0.021%	**0.615%**	0.028%	-0.027%	0.055%
QQQ	0.274%	-0.184%	0.458%	0.235%	-0.047%	**0.282%**
RSX	0.568%	-0.358%	0.926%	0.333%	-0.048%	0.381%
SPY	0.219%	-0.128%	0.347%	**0.154%**	0.000%	**0.153%**
THD	0.703%	-0.425%	**1.128%**	**0.565%**	-0.016%	**0.580%**
Average	0.511%	-0.260%	0.771%	0.299%	-0.070%	0.369%

Table 11: Bull-/Bear- Market-Sorted, Volatility-Adjusted Close-to-Close Returns By IBS bucket

Bull market days are defined as days which, at the close, have positive or zero 200-day return (including dividends), and vice versa. Returns are adjusted by the 10-day realized volatility. Bold values indicate that the returns of that bucket are statistically significantly greater (bottom bucket), or smaller (top bucket) than the average daily return, at the 1% confidence level. Note that despite greater means during bear markets, it is more difficult to establish statistical significance due to smaller sample sizes and higher variance. Bold values in the 1st - 5th columns indicate that the returns in the bottom and top buckets are significantly different at the 1% level.

	Bear			Bull		
Ticker	1st	5th	1st-5th	1st	5th	1st-5th
ECH	0.061	0.139	-0.077	0.003	0.116	-0.113
EEM	**0.234**	0.007	**0.227**	**0.186**	0.091	**0.095**
EFA	**0.125**	-0.054	**0.178**	0.208	-0.040	**0.248**
EPHE	**0.453**	-0.062	**0.516**	0.242	-0.019	**0.261**
EPI	0.132	**-0.094**	**0.226**	0.106	-0.139	0.246
EPP	0.129	-0.038	0.167	0.155	-0.006	**0.161**
EWA	**0.333**	**-0.171**	**0.504**	**0.236**	**-0.147**	**0.384**
EWC	0.166	-0.046	**0.212**	0.159	-0.011	**0.170**
EWD	**0.134**	**-0.168**	**0.302**	**0.218**	**-0.014**	**0.233**
EWG	0.137	**-0.103**	**0.240**	**0.231**	-0.030	**0.261**
EWH	**0.172**	**-0.178**	**0.349**	**0.317**	**-0.180**	**0.497**
EWI	**0.204**	**-0.192**	**0.396**	**0.198**	**-0.082**	**0.280**
EWJ	**0.255**	**-0.229**	**0.484**	**0.270**	**-0.124**	**0.394**
EWL	**0.331**	**-0.218**	**0.549**	**0.324**	**-0.146**	**0.470**
EWM	**0.149**	**-0.250**	**0.399**	**0.267**	**-0.138**	**0.404**
EWO	**0.176**	**-0.147**	**0.323**	**0.228**	**-0.040**	**0.268**
EWP	**0.196**	**-0.158**	**0.355**	**0.217**	**-0.071**	**0.287**
EWQ	**0.125**	-0.109	**0.235**	**0.225**	**-0.057**	**0.282**
EWS	**0.189**	**-0.250**	**0.440**	**0.340**	**-0.092**	**0.432**
EWT	**0.229**	**-0.129**	**0.357**	**0.241**	**-0.152**	**0.392**
EWU	**0.151**	**-0.138**	**0.290**	**0.303**	**-0.114**	**0.416**
EWY	**0.181**	-0.061	**0.242**	**0.227**	**-0.046**	**0.273**
EWZ	0.069	-0.030	0.099	0.056	0.132	-0.076
EZA	0.203	0.095	**0.108**	**0.209**	0.037	**0.172**
FXI	0.198	-0.087	**0.286**	**0.210**	0.031	**0.179**
GXG	0.130	0.104	0.026	0.050	0.124	-0.074
IDX	0.023	0.114	-0.091	0.212	0.032	0.181
ILF	0.087	0.105	-0.018	0.048	0.195	-0.147
IWM	**0.255**	0.023	**0.232**	-0.006	0.029	-0.035
QQQ	0.109	-0.057	0.166	0.131	0.018	**0.113**
RSX	0.108	-0.031	0.139	0.163	-0.027	0.191
SPY	0.097	-0.055	0.152	**0.166**	0.045	**0.121**
THD	0.225	-0.133	**0.358**	**0.322**	0.080	**0.242**
Average	0.175	-0.079	0.254	0.196	-0.023	0.218

Table 12: Volume-Sorted Close-to-Close Returns By IBS bucket

The table contains average close-to-close returns separated by IBS bucket, as well as the difference between the top and bottom buckets. High volume days are days whose volume was higher than the 500-day median volume, and vice versa. Bold values indicate that the returns of that bucket are statistically significantly greater (bottom bucket), or smaller (top bucket) than zero, and statistically significantly different from zero (1st - 5th buckets) at the 1% confidence level. Bold values in the 1st - 5th columns indicate that the returns in the bottom and top buckets are significantly different at the 1% level.

	High Volume			Low Volume		
Ticker	1st	5th	1st-5th	1st	5th	1st-5th
			Non-U.S. ETFs			
ECH	0.084%	0.194%	-0.111%	**0.528%**	0.162%	0.365%
EEM	**0.492%**	-0.071%	**0.562%**	0.382%	0.182%	0.201%
EFA	**0.263%**	-0.112%	**0.375%**	**0.331%**	-0.095%	**0.425%**
EPHE	0.443%	-0.121%	**0.564%**	**0.720%**	-0.218%	**0.939%**
EPI	0.441%	-0.184%	**0.625%**	0.749%	**-0.770%**	1.519%
EPP	0.329%	-0.022%	**0.352%**	0.101%	**-0.162%**	0.263%
EWA	**0.450%**	**-0.305%**	**0.755%**	**0.638%**	**-0.312%**	**0.951%**
EWC	0.191%	-0.042%	**0.233%**	0.235%	-0.095%	**0.329%**
EWD	**0.354%**	**-0.195%**	**0.549%**	**0.468%**	-0.152%	**0.620%**
EWG	**0.393%**	-0.093%	**0.486%**	0.168%	-0.185%	**0.352%**
EWH	**0.685%**	**-0.355%**	**1.040%**	**0.312%**	**-0.330%**	**0.642%**
EWI	**0.399%**	**-0.213%**	**0.611%**	**0.295%**	**-0.242%**	**0.537%**
EWJ	**0.498%**	**-0.308%**	**0.806%**	**0.368%**	**-0.303%**	**0.671%**
EWL	**0.495%**	**-0.238%**	**0.733%**	**0.527%**	**-0.346%**	**0.873%**
EWM	**0.318%**	**-0.325%**	**0.642%**	**0.358%**	**-0.312%**	**0.670%**
EWO	**0.270%**	**-0.144%**	**0.414%**	**0.446%**	**-0.261%**	**0.707%**
EWP	**0.313%**	**-0.122%**	**0.435%**	**0.407%**	**-0.361%**	**0.768%**
EWQ	**0.325%**	-0.085%	**0.410%**	0.211%	**-0.163%**	**0.374%**
EWS	**0.637%**	**-0.468%**	**1.105%**	**0.434%**	**-0.266%**	**0.701%**
EWT	**0.553%**	**-0.378%**	**0.931%**	0.324%	**-0.351%**	**0.675%**
EWU	**0.432%**	**-0.238%**	**0.671%**	0.227%	**-0.189%**	**0.416%**
EWY	**0.554%**	**-0.224%**	**0.777%**	0.294%	-0.138%	0.432%
EWZ	0.136%	0.037%	0.099%	0.316%	0.136%	0.180%
EZA	**0.576%**	-0.078%	**0.653%**	0.463%	-0.080%	**0.543%**
FXI	**0.824%**	-0.250%	**1.075%**	0.087%	-0.022%	0.109%
GXG	0.028%	0.105%	-0.077%	0.351%	0.194%	0.158%
IDX	0.469%	-0.175%	0.644%	0.226%	0.663%	-0.437%
ILF	0.314%	0.143%	0.171%	0.009%	0.242%	-0.233%
RSX	0.491%	-0.260%	**0.751%**	0.157%	0.184%	-0.027%
THD	**0.611%**	-0.105%	**0.716%**	0.649%	-0.221%	**0.870%**
Average	0.412%	-0.154%	0.567%	0.359%	-0.127%	0.486%
			U.S. ETFs			
SPY	**0.207%**	-0.036%	**0.243%**	0.050%	-0.009%	0.059%
IWM	**0.256%**	-0.097%	**0.353%**	0.239%	0.240%	-0.001%
QQQ	**0.344%**	-0.174%	**0.519%**	0.055%	0.018%	0.037%
Average	0.269%	-0.102%	0.372%	0.115%	0.083%	0.032%

Table 13: Volume-Sorted, Volatility-Adjusted Close-to-Close Returns By IBS bucket

The table contains average volatility-adjusted close-to-close returns separated by IBS bucket, as well as the difference between the top and bottom buckets. High volume days are days whose volume was higher than the 500-day median volume, and vice versa. Returns are adjusted by the 10-day realized volatility. Bold values indicate that the returns of that bucket are statistically significantly greater (bottom bucket), or smaller (top bucket) than zero at the 1% confidence level. Bold values in the 1st - 5th columns indicate that the returns in the bottom and top buckets are significantly different at the 1% level.

	High Volume			Low Volume		
Ticker	1st	5th	1st-5th	1st	5th	1st-5th
			Foreign Country ETFs			
ECH	-0.044	0.070	-0.114	**0.154**	0.152	0.002
EEM	**0.196**	0.032	**0.164**	0.221	0.132	0.090
EFA	**0.159**	-0.041	**0.200**	**0.310**	-0.126	**0.435**
EPHE	0.266	-0.064	**0.330**	**0.572**	-0.127	**0.699**
EPI	0.153	-0.076	**0.229**	0.147	**-0.215**	0.362
EPP	0.153	-0.014	**0.167**	0.155	**-0.077**	0.232
EWA	**0.251**	**-0.214**	**0.465**	**0.418**	**-0.180**	**0.598**
EWC	0.175	-0.039	**0.214**	0.178	-0.066	**0.245**
EWD	**0.206**	**-0.094**	**0.300**	**0.228**	-0.048	**0.276**
EWG	**0.263**	-0.074	**0.337**	0.154	-0.097	**0.251**
EWH	**0.350**	**-0.184**	**0.534**	**0.221**	**-0.245**	**0.465**
EWI	**0.279**	**-0.155**	**0.433**	**0.161**	**-0.164**	**0.324**
EWJ	**0.298**	**-0.202**	**0.500**	**0.321**	**-0.251**	**0.572**
EWL	**0.355**	**-0.170**	**0.525**	**0.388**	**-0.269**	**0.656**
EWM	**0.281**	**-0.158**	**0.439**	**0.182**	**-0.228**	**0.410**
EWO	**0.214**	**-0.101**	**0.315**	**0.284**	**-0.133**	**0.417**
EWP	**0.230**	**-0.079**	**0.309**	**0.232**	**-0.220**	**0.453**
EWQ	**0.242**	-0.076	**0.318**	0.153	**-0.134**	**0.287**
EWS	**0.326**	**-0.211**	**0.537**	**0.233**	**-0.136**	**0.369**
EWT	**0.269**	**-0.168**	**0.437**	0.249	**-0.195**	**0.444**
EWU	**0.295**	**-0.171**	**0.466**	0.231	**-0.150**	**0.382**
EWY	**0.236**	**-0.131**	**0.367**	0.188	0.007	0.181
EWZ	0.041	0.036	0.005	0.104	0.078	0.026
EZA	**0.256**	0.015	**0.242**	0.146	0.043	**0.102**
FXI	**0.267**	-0.021	**0.288**	0.115	-0.022	0.137
GXG	0.008	0.115	-0.107	0.251	0.145	0.106
IDX	0.121	-0.126	0.248	0.310	0.324	-0.014
ILF	0.078	0.152	-0.075	-0.027	0.179	-0.206
RSX	0.113	-0.060	**0.172**	0.221	0.035	0.186
THD	**0.341**	0.011	**0.330**	0.280	-0.055	**0.335**
Average	0.213	-0.073	0.286	0.226	-0.068	0.294
			U.S. ETFs			
SPY	**0.184**	0.002	**0.182**	0.068	0.022	0.046
IWM	**0.138**	-0.057	**0.195**	0.043	0.148	-0.106
QQQ	**0.191**	-0.077	**0.268**	0.069	0.035	0.034
Average	0.171	-0.044	0.215	0.060	0.068	-0.009

Table 14: Bottom - Top Bucket Difference of Average Close-to-Close Returns by Day of the Week

This table contains the difference in average close-to-close returns between the 1st and 5th IBS buckets, sorted by the day of the week.

	Day of the Week				
Ticker	Monday	Tuesday	Wednesday	Thursday	Friday
ECH	0.431%	-0.244%	-0.043%	-0.385%	0.707%
EEM	1.089%	0.323%	0.469%	0.341%	0.230%
EFA	0.689%	0.528%	0.340%	0.156%	0.214%
EPHE	1.251%	0.437%	0.694%	0.813%	0.392%
EPI	1.585%	0.796%	1.221%	0.630%	0.106%
EPP	0.771%	0.257%	-0.037%	0.470%	0.204%
EWA	1.252%	0.708%	0.636%	0.724%	0.790%
EWC	0.548%	0.178%	0.175%	0.226%	0.188%
EWD	0.859%	0.626%	0.418%	0.731%	0.319%
EWG	0.797%	0.505%	0.321%	0.301%	0.281%
EWH	1.382%	0.851%	0.839%	0.983%	0.333%
EWI	0.855%	0.543%	0.390%	0.504%	0.613%
EWJ	1.163%	0.888%	0.524%	0.750%	0.533%
EWL	1.030%	0.824%	0.547%	0.885%	0.664%
EWM	0.565%	0.555%	0.876%	0.691%	0.521%
EWO	0.730%	0.521%	0.403%	0.420%	0.597%
EWP	1.071%	0.272%	0.481%	0.578%	0.395%
EWQ	0.801%	0.430%	0.101%	0.293%	0.409%
EWS	1.234%	0.926%	0.989%	0.930%	0.608%
EWT	1.446%	0.753%	0.666%	0.660%	0.795%
EWU	0.755%	0.793%	0.476%	0.591%	0.342%
EWY	1.447%	0.811%	0.364%	0.718%	0.041%
EWZ	0.519%	0.267%	-0.322%	0.008%	0.051%
EZA	0.854%	0.658%	0.357%	0.548%	0.559%
FXI	1.310%	0.803%	0.585%	1.088%	0.236%
GXG	0.235%	-0.587%	0.392%	0.113%	-0.046%
IDX	0.348%	0.043%	0.436%	0.375%	0.231%
ILF	0.447%	0.135%	-0.146%	-0.083%	-0.375%
IWM	0.518%	0.264%	0.303%	0.396%	-0.156%
QQQ	0.662%	0.488%	0.426%	0.318%	-0.136%
RSX	0.708%	0.752%	1.854%	-0.050%	-0.201%
SPY	0.474%	0.298%	0.132%	0.103%	0.014%
THD	1.288%	0.677%	1.086%	0.593%	0.139%
Average	0.882%	0.487%	0.483%	0.467%	0.291%

Table 15: Close-to-Close Return Skewness by IBS bucket

Skewness of Close-to-Close Returns sorted by IBS bucket. Skewness values statistically significantly different from zero at the 1% level are highlighted in bold.

	Buckets					
Ticker	1st	2nd	3rd	4th	5th	1st-5th
ECH	**1.163**	**1.487**	-0.303	0.235	**-0.903**	2.066
EEM	0.367	0.093	**4.066**	**1.317**	**0.263**	0.105
EFA	**1.728**	**-0.473**	-0.503	**0.802**	-0.090	1.819
EPHE	**0.822**	0.878	0.058	-0.847	-0.179	1.001
EPI	**-1.318**	**2.599**	**1.037**	**2.276**	**-0.251**	-1.067
EPP	**0.524**	**1.989**	**2.632**	-0.253	**-0.193**	0.717
EWA	**-0.425**	**0.653**	**0.893**	**1.089**	0.059	-0.484
EWC	0.023	**0.926**	**-0.835**	**-0.776**	**-0.369**	0.392
EWD	0.036	**1.269**	**1.705**	**0.749**	**-0.162**	0.198
EWG	**-0.323**	**1.027**	**0.618**	-0.024	**0.232**	-0.555
EWH	**2.539**	-0.085	-0.160	**-1.293**	0.082	2.457
EWI	**0.361**	**-0.469**	**0.510**	0.095	-0.080	0.441
EWJ	**0.825**	**1.752**	-0.079	-0.432	**0.388**	0.437
EWL	**0.311**	**-0.929**	**1.144**	-0.428	**-0.229**	0.540
EWM	**1.370**	**1.044**	**-2.003**	**-0.547**	**0.754**	0.615
EWO	**0.581**	-0.319	**-0.760**	**-0.744**	**-0.365**	0.946
EWP	**0.374**	**0.839**	0.522	**-1.090**	-0.010	0.383
EWQ	**0.736**	0.463	**0.503**	**-1.615**	**-0.158**	0.894
EWS	**1.426**	-0.358	-0.324	0.439	**0.275**	1.151
EWT	0.049	0.461	**0.991**	**1.683**	0.006	0.043
EWU	**2.166**	-0.307	**-0.548**	**-1.074**	**-0.245**	2.412
EWY	**0.717**	**-1.225**	**1.375**	**0.606**	**0.498**	0.220
EWZ	0.037	0.211	**-1.021**	-0.116	0.060	-0.024
EZA	**1.128**	-0.332	**-0.910**	**4.282**	**-0.604**	1.732
FXI	**2.912**	-0.219	**1.974**	**0.935**	0.031	2.881
GXG	-0.229	0.498	-0.105	0.273	-0.081	-0.148
IDX	-0.307	**-1.277**	-0.352	0.128	**0.558**	-0.864
ILF	**1.030**	-0.239	**-1.038**	**2.318**	0.099	0.931
IWM	**0.666**	**1.198**	0.322	**0.506**	**-0.473**	1.139
QQQ	0.220	**1.059**	-0.148	-0.328	**0.338**	-0.118
RSX	**1.403**	**-1.719**	0.038	**2.072**	0.026	1.376
SPY	**0.406**	**1.947**	**-0.929**	**-1.766**	-0.012	0.418
THD	0.193	-0.311	0.020	0.549	**-0.185**	0.377
Average	0.652	0.368	0.254	0.273	-0.028	0.680

Table 16: RSI Strategy Statistics

Average daily returns, total returns, daily return win rate, and total days spent in market for the RSI(3) strategy and the RSI(3) strategy with the IBS ≤ 0.5 filter.

	RSI(3) Only				RSI(3) w/ IBS Filter				IBS <0.5	
Ticker	Mean	Sum	WR	Days	Mean	Sum	WR	Days	Mean	WR
ECH	-0.054%	-17.0%	51.4%	315	-0.055%	-10.5%	50.3%	189	-0.009%	48.9%
EEM	0.268%	129.0%	57.1%	482	0.441%	129.2%	61.4%	293	0.260%	56.9%
EFA	0.134%	77.7%	51.6%	580	0.215%	77.2%	52.2%	360	0.160%	55.4%
EPHE	0.040%	4.6%	51.3%	115	0.074%	4.7%	46.9%	64	0.271%	58.1%
EPI	-0.022%	-6.5%	52.3%	287	0.073%	12.6%	50.6%	172	0.282%	54.4%
EPP	0.266%	139.3%	57.0%	523	0.375%	115.4%	56.5%	308	0.196%	55.5%
EWA	0.293%	237.1%	55.7%	809	0.527%	234.5%	59.1%	445	0.358%	56.9%
EWC	0.058%	52.9%	50.3%	908	0.161%	80.9%	54.4%	502	0.153%	53.9%
EWD	0.288%	270.2%	53.4%	939	0.461%	217.6%	56.4%	472	0.243%	53.5%
EWG	0.097%	88.0%	50.6%	911	0.202%	103.7%	51.7%	513	0.180%	53.8%
EWH	0.138%	129.6%	48.8%	939	0.443%	248.4%	53.1%	561	0.301%	53.8%
EWI	0.139%	127.8%	52.0%	920	0.225%	119.1%	52.8%	528	0.223%	54.7%
EWJ	0.067%	67.4%	50.8%	1008	0.268%	156.3%	56.1%	583	0.249%	53.6%
EWL	0.125%	109.7%	50.5%	877	0.322%	160.8%	54.9%	499	0.341%	57.4%
EWM	0.054%	52.3%	44.3%	970	0.238%	129.5%	48.2%	544	0.287%	52.8%
EWO	0.048%	46.9%	45.6%	976	0.212%	95.7%	52.7%	452	0.268%	55.6%
EWP	0.223%	198.6%	52.2%	890	0.357%	164.7%	54.0%	461	0.252%	55.0%
EWQ	0.176%	159.7%	50.9%	906	0.260%	139.7%	52.5%	537	0.195%	54.1%
EWS	0.288%	243.7%	52.5%	847	0.580%	298.3%	58.2%	514	0.360%	55.0%
EWT	0.145%	104.1%	52.8%	720	0.412%	166.7%	55.8%	405	0.321%	54.4%
EWU	0.195%	171.0%	52.8%	875	0.323%	154.5%	55.3%	479	0.244%	55.7%
EWY	0.272%	170.2%	54.6%	625	0.504%	178.9%	57.5%	355	0.272%	54.9%
EWZ	0.179%	128.2%	51.8%	716	0.210%	88.5%	53.4%	421	0.070%	51.4%
EZA	0.372%	173.9%	60.0%	467	0.326%	85.0%	57.9%	261	0.284%	57.1%
FXI	0.258%	118.8%	56.3%	460	0.479%	119.9%	56.4%	250	0.353%	55.1%
GXG	0.294%	58.7%	60.5%	200	0.022%	2.6%	53.0%	115	0.109%	50.6%
IDX	0.223%	40.8%	53.0%	183	0.281%	29.8%	51.9%	106	0.196%	53.8%
ILF	0.210%	107.3%	54.5%	512	0.236%	76.0%	54.7%	322	0.081%	53.1%
IWM	0.120%	83.0%	54.3%	694	0.265%	118.1%	57.8%	446	0.141%	54.5%
QQQ	0.279%	211.4%	55.0%	757	0.454%	236.6%	59.3%	521	0.162%	54.7%
RSX	0.311%	101.2%	54.8%	325	0.396%	72.4%	56.3%	183	0.081%	53.5%
SPY	0.182%	192.6%	58.9%	1057	0.287%	194.8%	62.2%	679	0.091%	55.5%
THD	-0.027%	-6.6%	55.9%	247	0.247%	34.8%	57.4%	141	0.369%	60.4%
Average	0.171%	114.1%	53.1%	668	0.298%	122.3%	54.9%	384	0.223%	54.6%

Figures

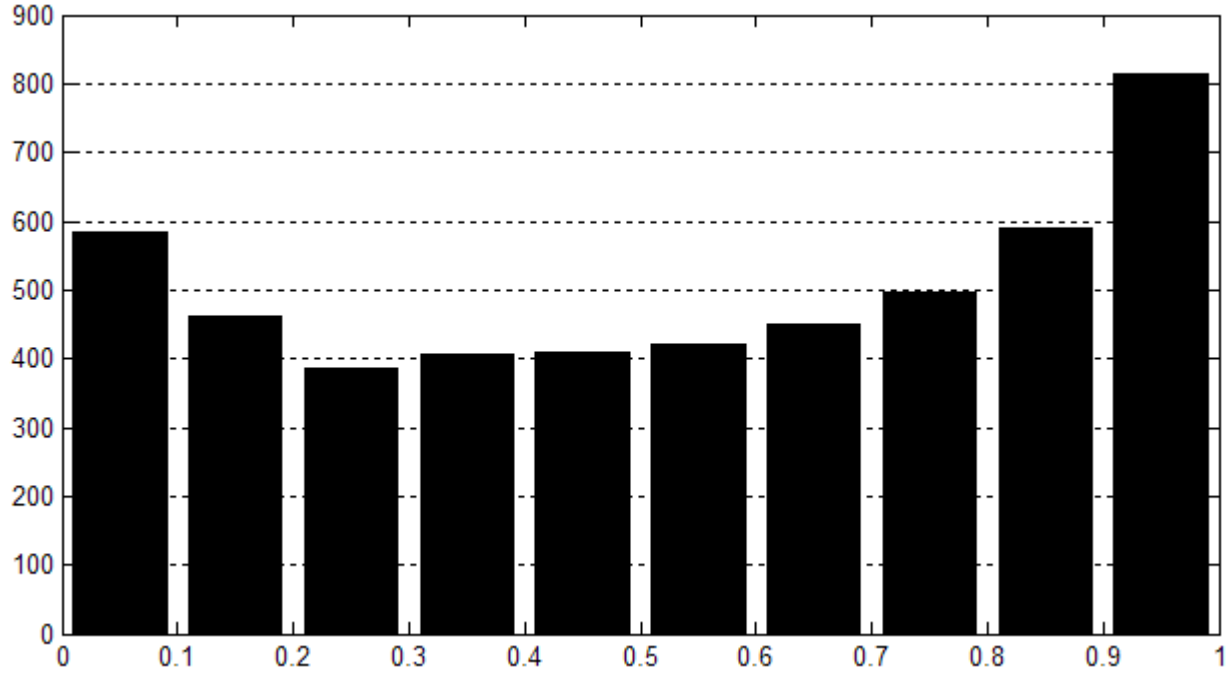

Figure 1: Histogram of IBS values for SPY.

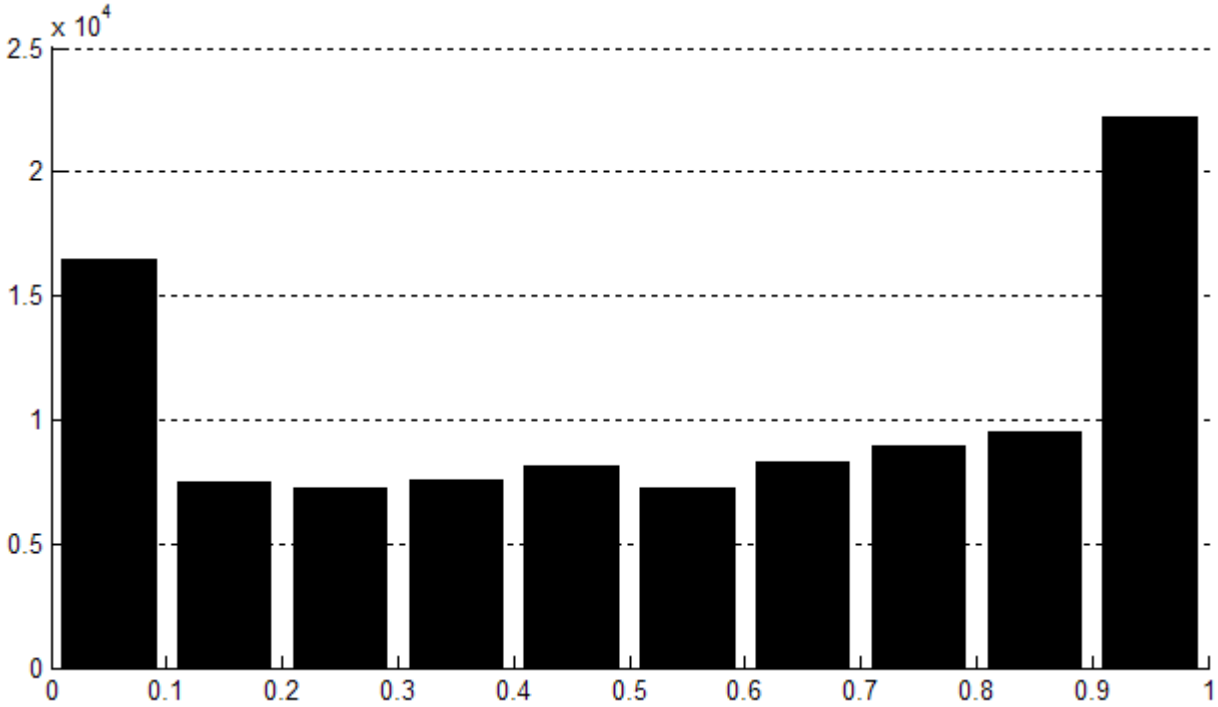

Figure 2: Histogram of IBS values for all ETFs.

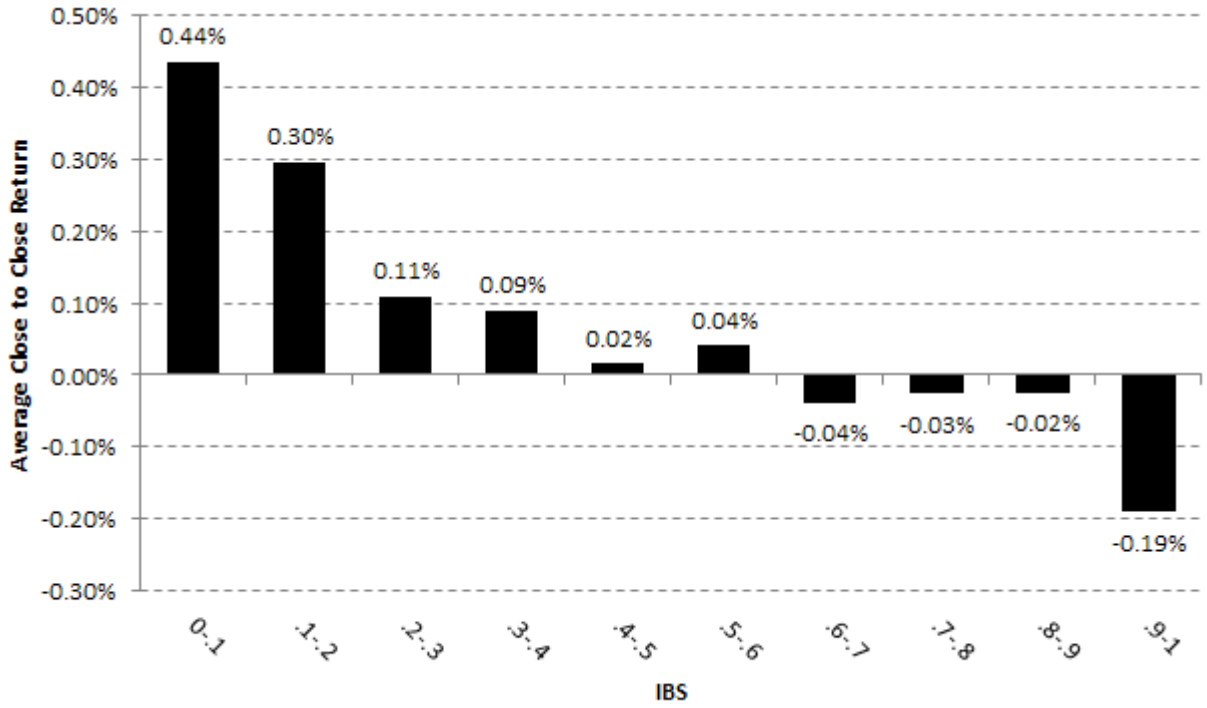

Figure 3: IBS plotted against Close-to-Close Returns, average for all ETFs.

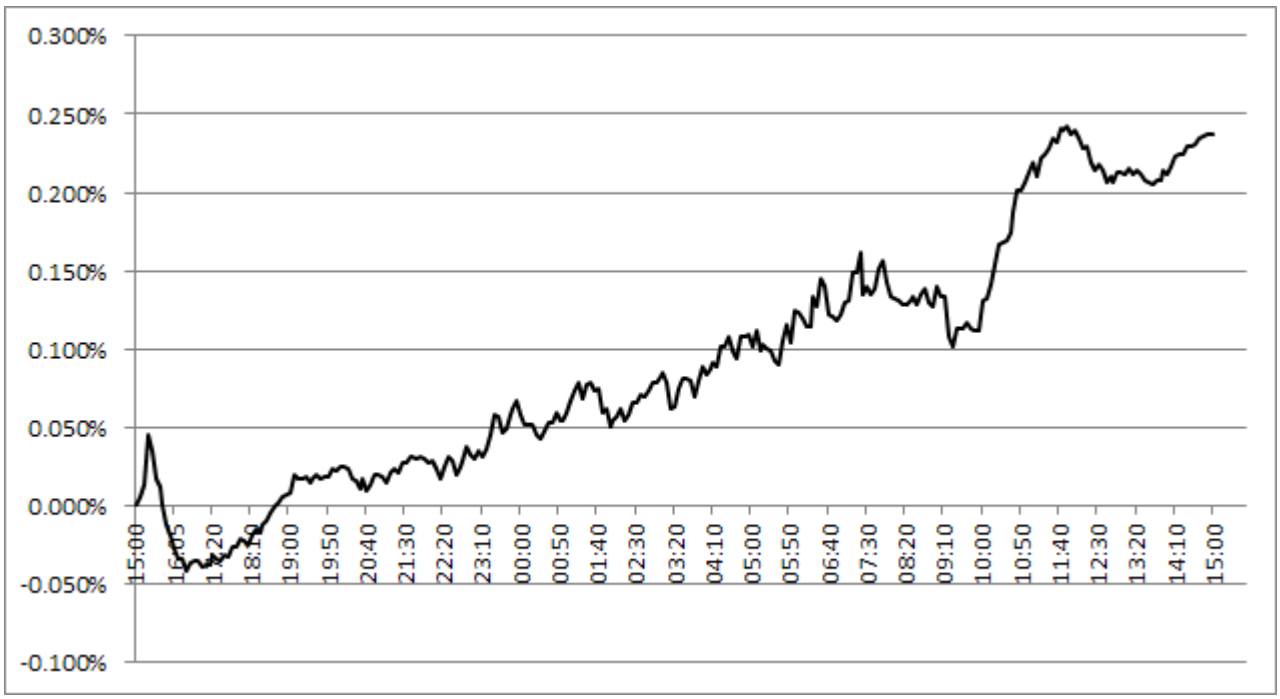

Figure 4: Cumulative Returns to NASDAQ 100 Futures After IBS <0.2 At 15:00 CT

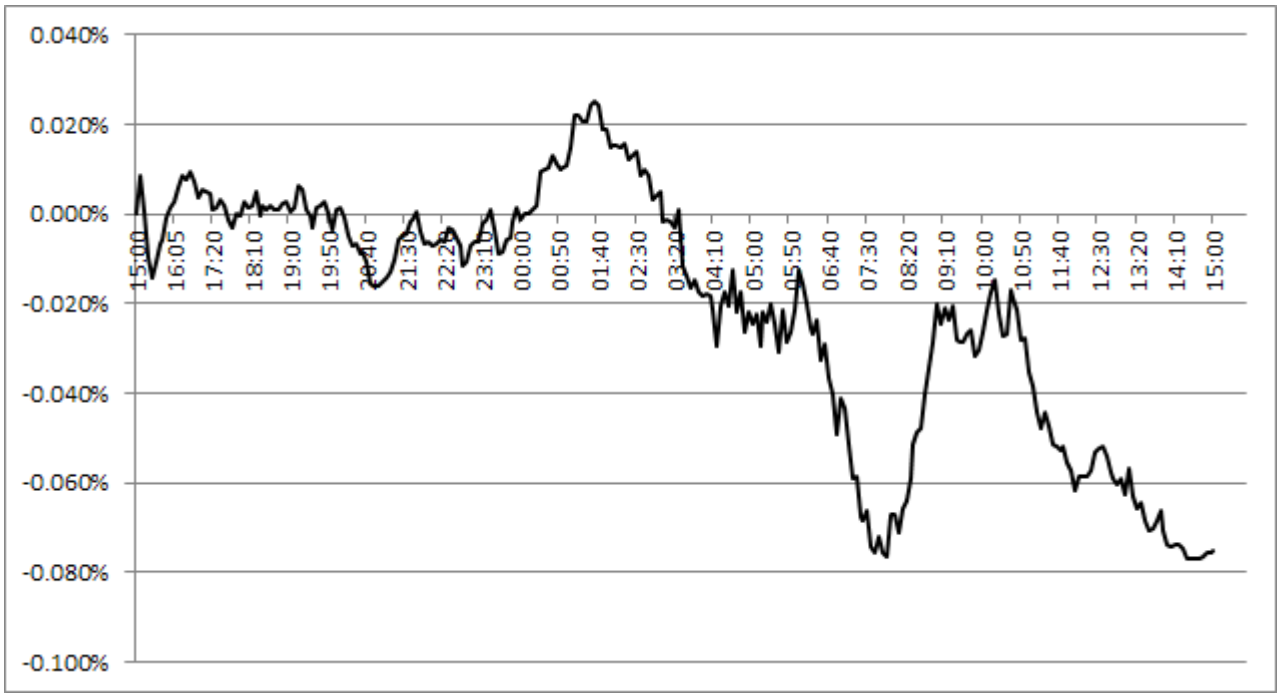

Figure 5: Cumulative Returns to NASDAQ 100 E-mini Futures After IBS >0.8 At 15:00 CT

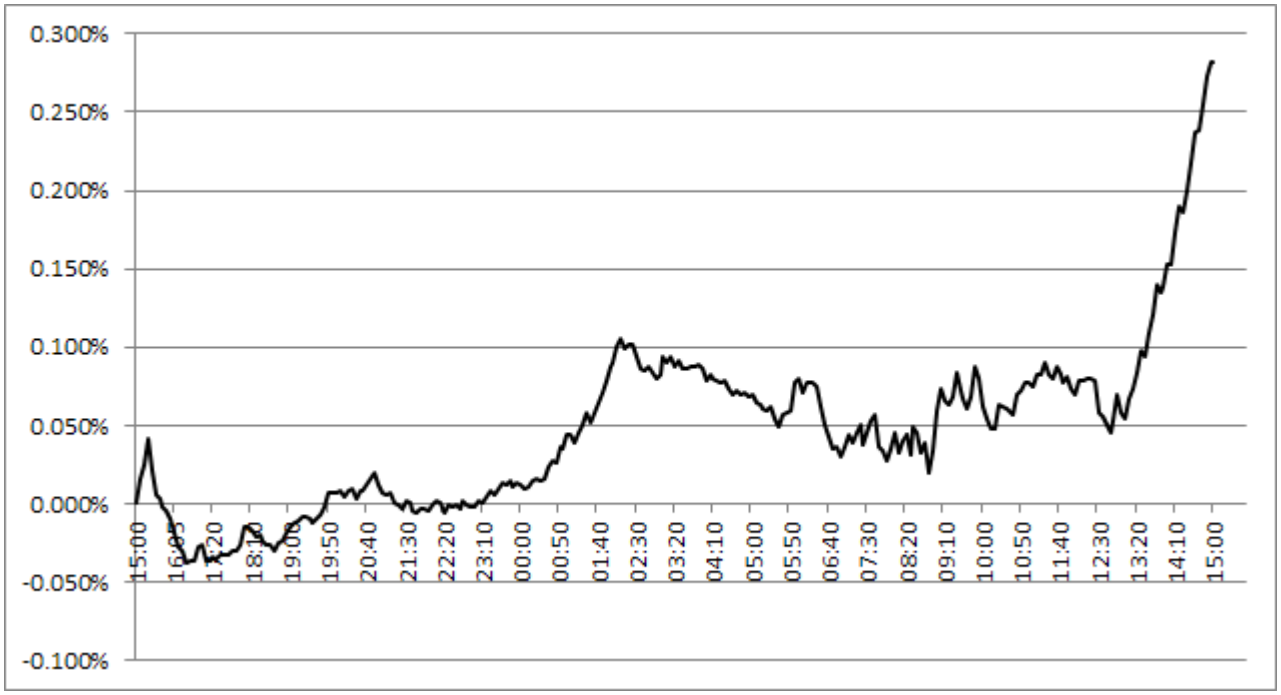

Figure 6: Cumulative Returns to S&P 500 E-mini Futures After IBS <0.2 At 15:00 CT

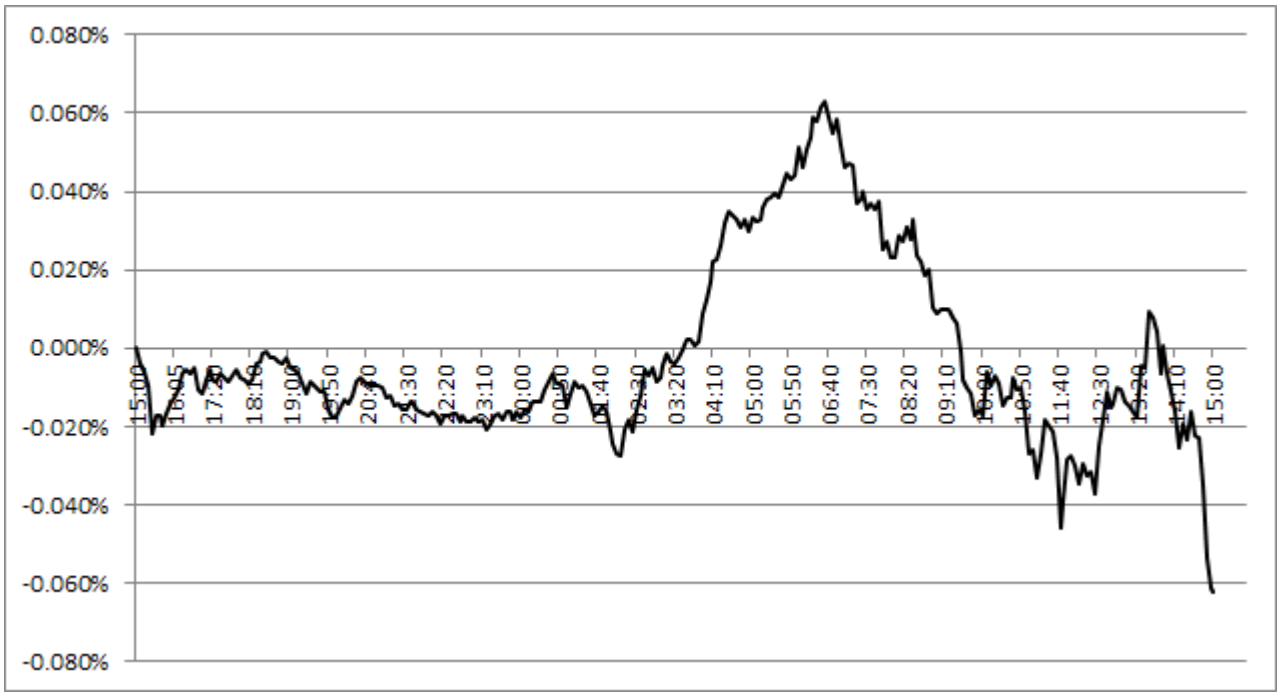

Figure 7: Cumulative Returns to S&P 500 E-mini Futures After IBS >0.8 At 15:00 CT

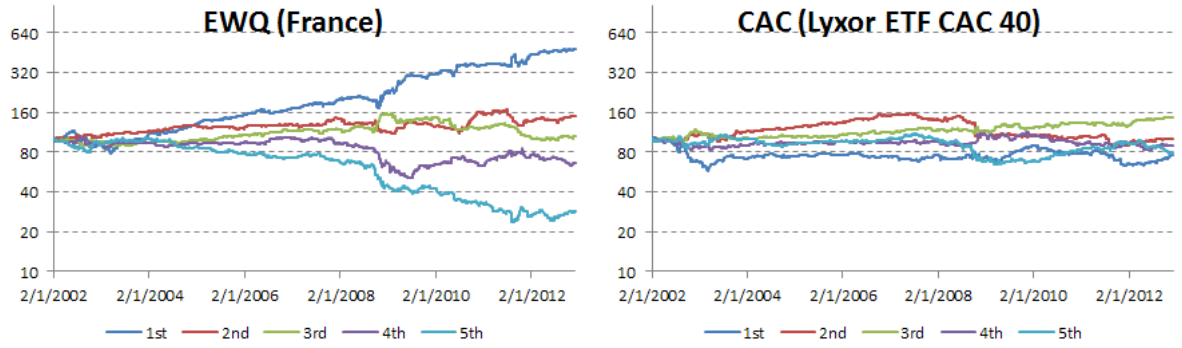

Figure 8: U.S.- and Locally-Listed France ETF Cumulative Performance by IBS Bucket

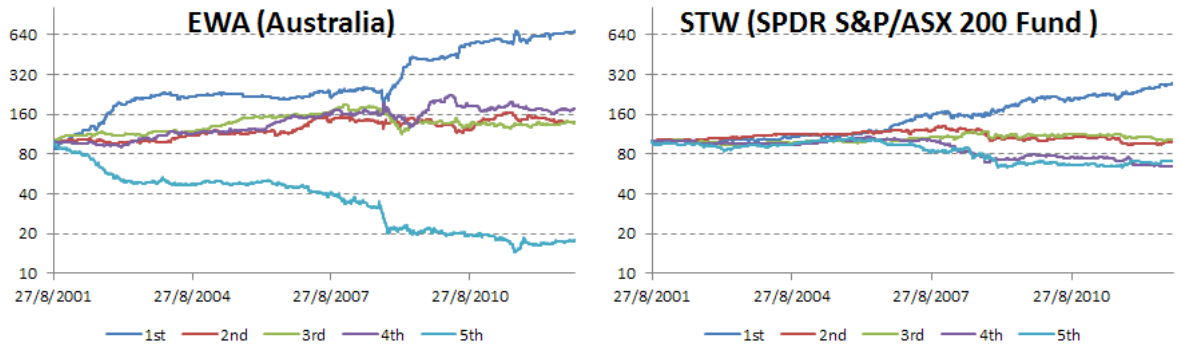

Figure 9: U.S.- and Locally-Listed Austria ETF Cumulative Performance by IBS Bucket

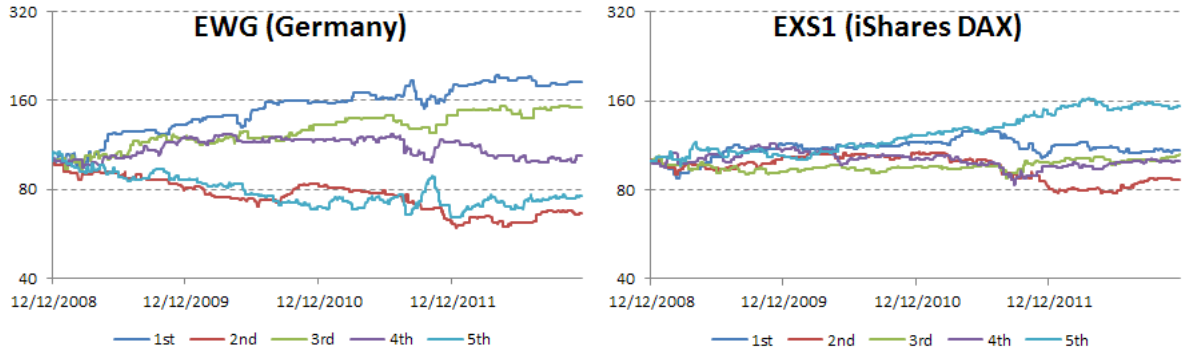

Figure 10: U.S.- and Locally-Listed Germany ETF Cumulative Performance by IBS Bucket

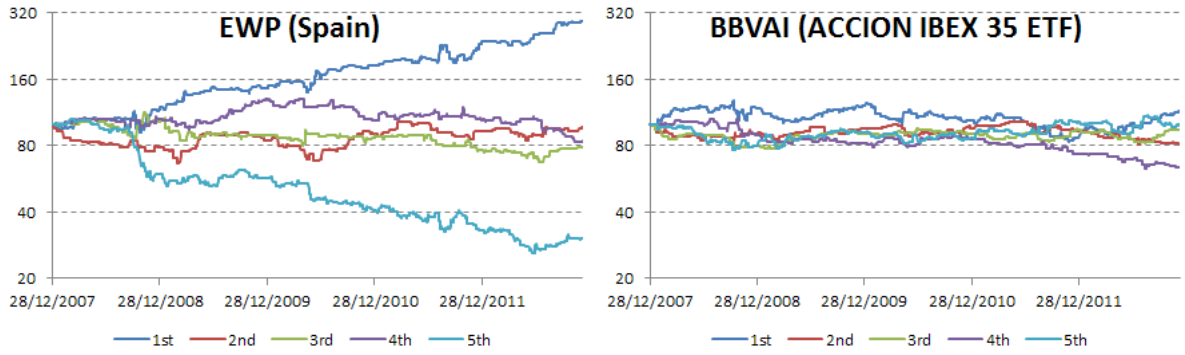

Figure 11: U.S.- and Locally-Listed Spain ETF Cumulative Performance by IBS Bucket

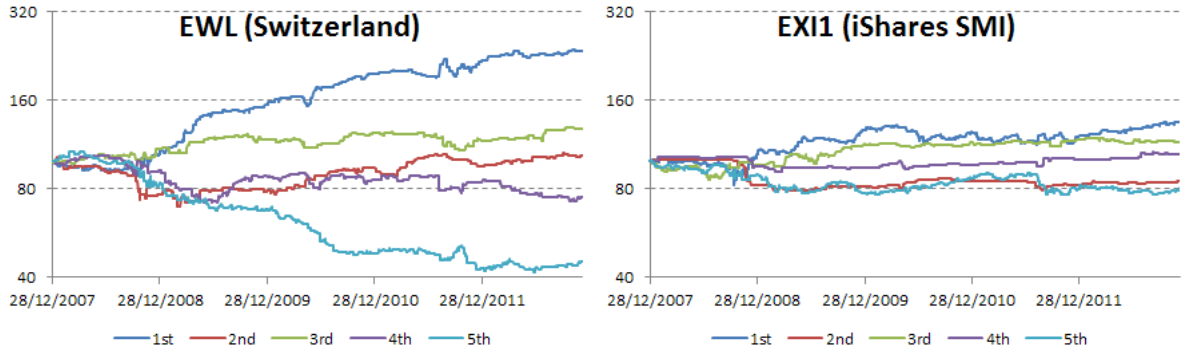

Figure 12: U.S.- and Locally-Listed Switzerland ETF Cumulative Performance by IBS Bucket

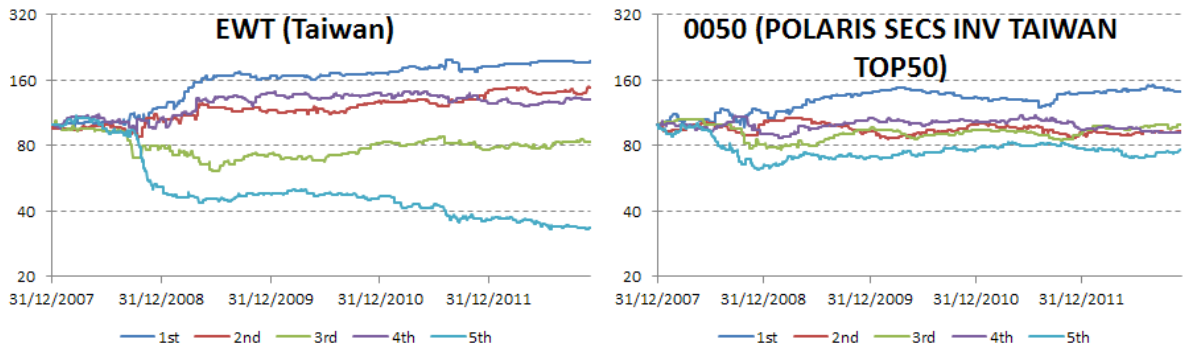

Figure 13: U.S.- and Locally-Listed Taiwan ETF Cumulative Performance by IBS Bucket

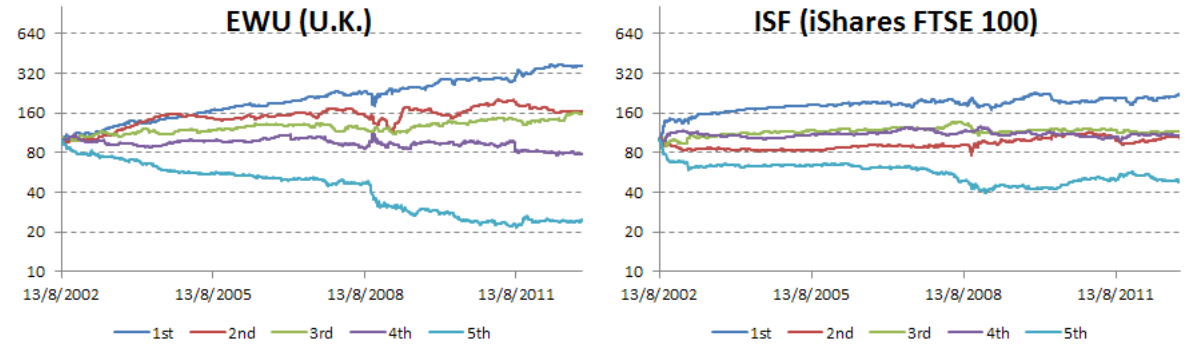

Figure 14: U.S.- and Locally-Listed U.K. ETF Cumulative Performance by IBS Bucket

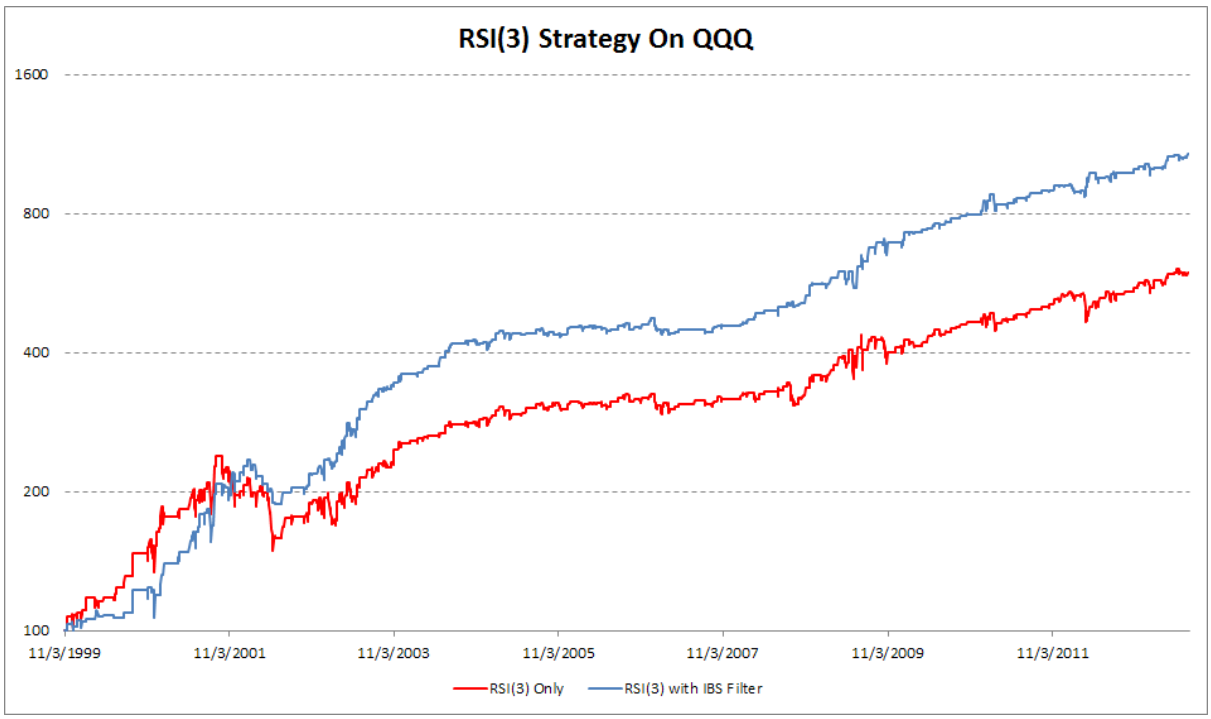

Figure 15: RSI(3) Strategy Applied to QQQ, Equity Curve