

Small- Large-Cap Trading
The Snail Strategy
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“It is not only the fox, even the snail arrives at its destination.”
(Nigerian Proverb)

Abstract:

Small-Caps outperform in normal times Large-Caps. But during crashes there is a flight to quality. Large-Caps loose less. The Snail Strategy goes therefore in normal times a Small-Cap ETF long and a Large-Cap ETF short. The roles are reversed in times of troubles. One goes the Large-Cap long and the Small-Cap short. The critical point of such a strategy is the correct classification of market-regimes. For this purpose the Implied-Volatility-Term-Structure (IVTS) is used. The IVTS is the leitmotif in the Sybil project. It is used in several Sibyl-Working-Papers (see [1],[2],[3],[4]). The IVTS does again a good job in regime-classification. The strategy performs especially well in crash phases. But it suffers in the last 2 years from the small margin between Small- and Large-Caps. It is not a trivial task to find liquid Small-Cap ETFs which outperform the SPY in recent time. The Snail Strategy delivers no spectacular immediate results. It is a strategy for the patient investor. To speed it up one can leverage the position.

The Implied Volatility Term Structure:

The Implied Volatility Term Structure is defined as:

$$IVTS(t) = VIX(t) / VXV(t) \quad (1)$$

VXV is the implied volatility of S&P-options with 3 month maturity. Besides the different maturity the calculation is the same as for the VIX. Under normal market conditions the VXV is larger than the VIX. Hence the IVTS is below 1.0. But in times of troubles the VIX goes up much faster and the IVTS is above 1.0. The behavior of the IVTS is closely related to the contango and backwardation condition of VIX Futures.

The VIX Futures Term Structure:

The IVTS is a simple and useful tool. But one is restricted to a single maturity difference. Theoretically one could calculate a 2-months or 4-months equivalent of the VXV, but the payoff should be in comparison to the necessary effort minor. For the VIX and the VXV the CME does the involved job and it is trivial to use the final result.

But one can use the term structure of the VIX futures for a similar purpose. VIX futures have an own inherent logic, but there is obviously a close relationship with the implied volatility-surface of SPX options.

The Mojito and Kir-Strategies ([1], [3]) use the VIX Futures-30 ratio. For the VIX Futures-30 ratio one divides the VIX by the value of a VIX future with a maturity of 30 calendar days. Usually such a future does not exist. In this case one calculates the weighted mean of the 1st and the 2nd nearest future. If e.g. the first future has a maturity of 20 days, and the second a maturity of 50 days, one calculates the VIX Futures 30 value as $2/3 * \text{Future}_1 + 1/3 * \text{Future}_2$. Another interesting ratio is the VIX-Futures

30-45 ratio. In this case one divides the 30-days maturity with the 45-days maturity future. The 45-days maturity is again the weighted mean of the 2nd and 3rd future.

The VIX Futures-30 ratio reacts somewhat faster to regime changes. This increases of course also the risk of false alarms. The VIX Futures-30-45 ratio behaves slower and smoother.

In the current study the simple IVTS performed slightly better than the VIX Futures 30 ratio (for the Mojito and Kir it is the other way round). The slower moving 30-45-ratio was clearly worse. This is consistent with prior studies. The results section shows therefore only the performance of the IVTS market-regime indicator.

The Allocation Method:

In the simplest case one starts with a given index-value/cash and goes always the index value short and long. The Small- and Large-Cap ETF is equally weighted. The Donkey- and Mule Strategies in [5] weighted the positions with the inverse volatility. The Volatility was calculated for a time-window of 2 months with the Yang-Zhang Volatility estimator ([6]).

In this study the inverse volatility-ratio as defined in (2) and (3) gave by far the best results.

$$\text{Weight}(\text{large}) = \text{Volatility}(\text{small}) / \text{Volatility}(\text{large}) \quad (2)$$

$$\text{Weight}(\text{small}) = \text{Volatility}(\text{large}) / \text{Volatility}(\text{small}) \quad (3)$$

The ratios in (2) and (3) change dynamically. It is not always the volatility of the Small-Caps larger than the volatility of the Large-Caps. If the Small-Cap ETF is in a strong rally, the volatility decreases and hence the weight of the Small-Caps is increased.

The Snail-Strategy:

The Snail uses the IVTS from (1) as the market-regime indicator. There are 3 regimes.

IVTS \leq 0.96: Small-Cap with weight (3) long, Large-Cap according (2) short.

IVTS in (0.96,1.0]. Stay on sideline. Both weights are set to Null.

IVTS $>$ 1.0: Large-Cap with weight (2) long, Small-Cap with weight (3) short.

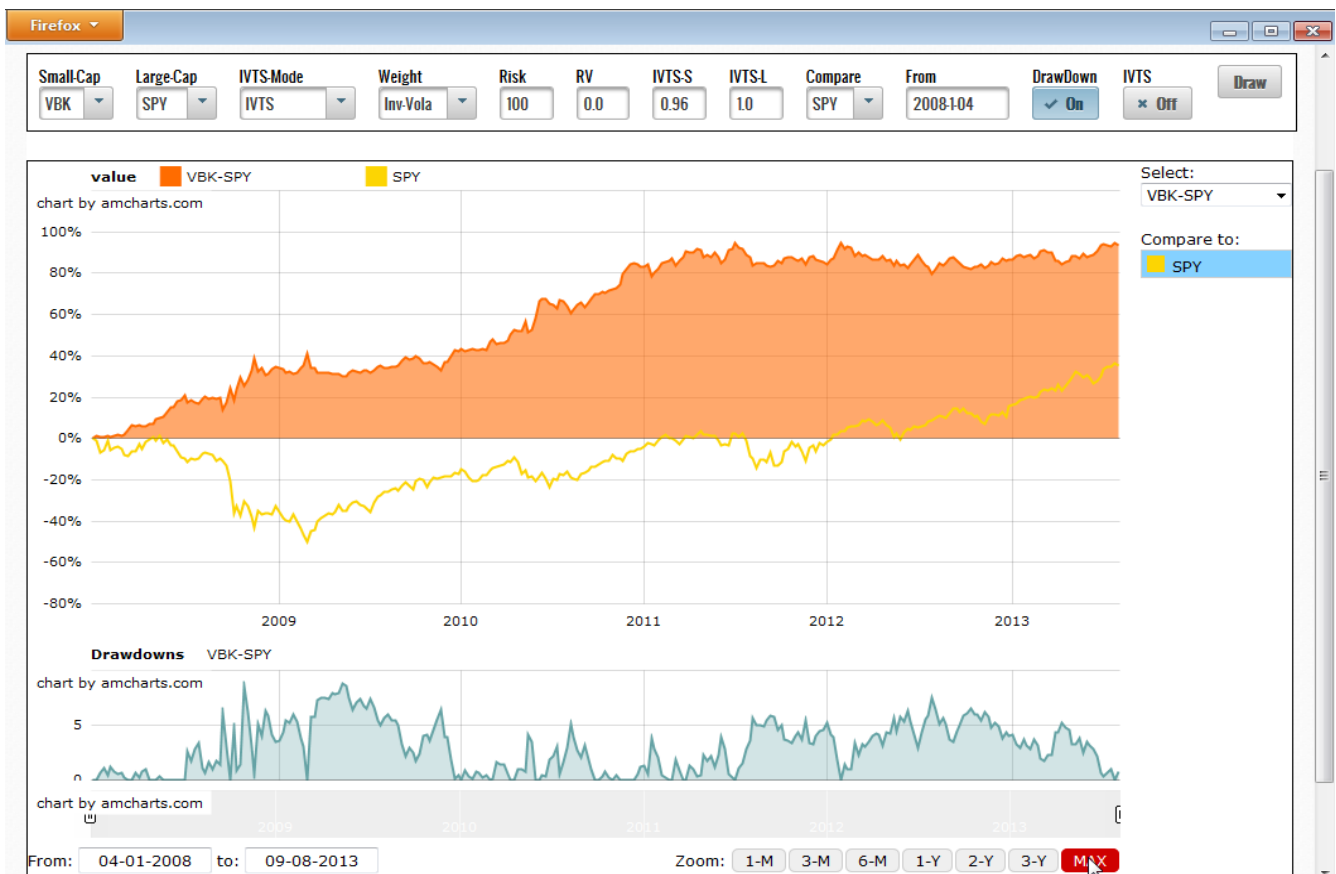
The historic simulation starts at 2008-01-04 and ends at 2013-08-08. The initial index-value is 1.000.000.

The results are generally not very sensitive to the lower bounds. One can choose the smaller threshold from 0.93 to 1.0 without changing the overall pattern. The threshold of 1.0 for the Large-Cap regime is critical. This marks a severe market crash and it is essential to react immediate.

Results:

Graphic-1 shows the overall performance of the small-cap VBK (Vanguard Small-Cap Growth) with the SPY. The VBK is a highly liquid ETF with net assets of 11.80 Billion. It is the best suited small-cap ETF I could find. An alternative is the IJH (iShares Core S&P Mid-Cap) with net assets of 17.38B. The IJH follows the S&P-Midcap Index. For this index there are also the liquid EMD futures available. But the performance of the VBK is for the Snail Strategy superior to the IJH or the EMD futures.

As can be seen in Graphic-1 the snail outpaces the fox in the long run. This can be mainly attributed to the different behavior in the 2008 crash. The fox heads into the wrong direction, whereas the



Graphic-1: VBK v. SPY, 2008-01-04 till 2013-08-08 (orange), SPY (yellow)

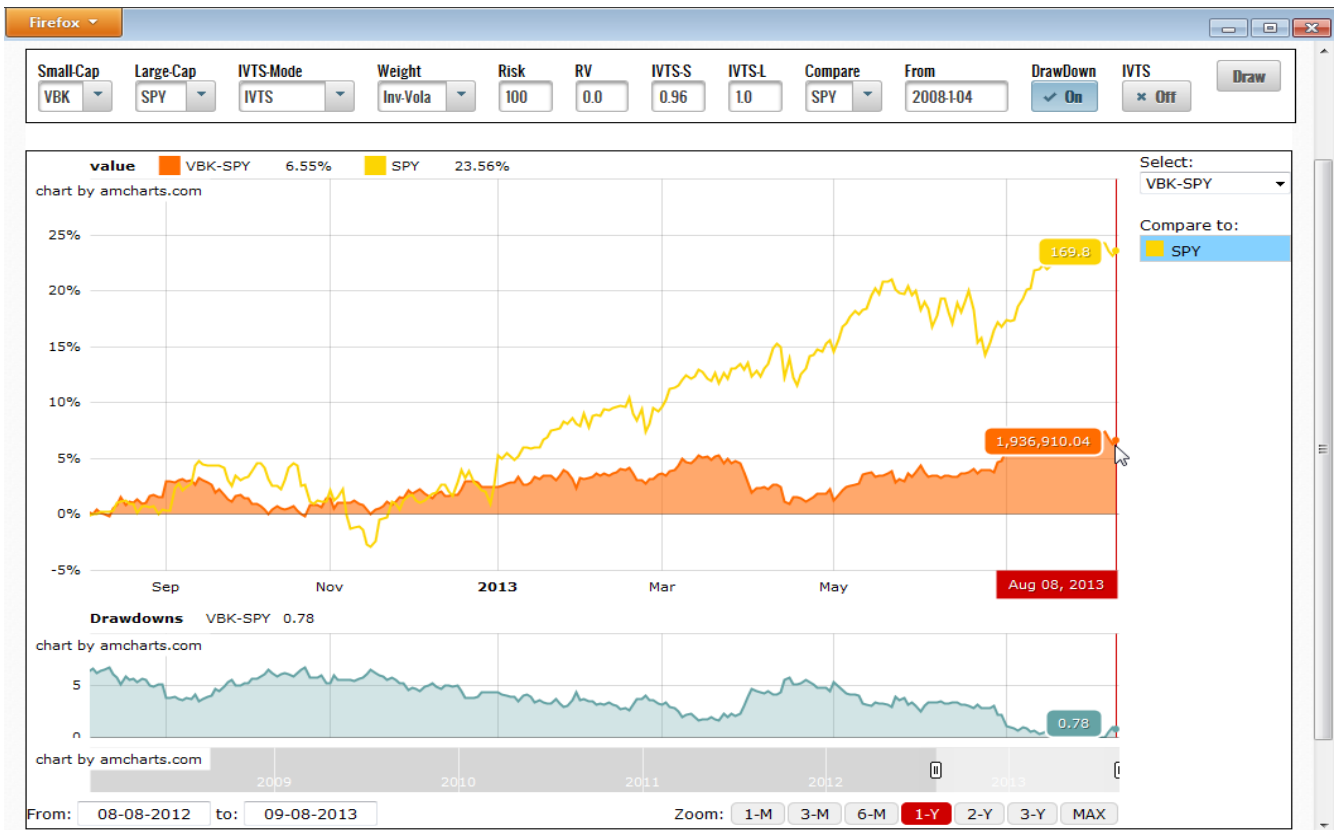
snail has in the crash its best time. The IVTS does in the 2008 crash a good job to flip in the right moment the position. It performs also reasonable in the August 2011 crash. The VBK-SPY snail increases over the whole period by 93.7%. The SPY increases by 35.3%.

Graphic-2 shows the performance in the last year. The fox dwarfs the snail in this time period with 23.5% to 6.5%. But the performance of the snail is considerable smoother. This fact is exploited with the ultra snail (see below).

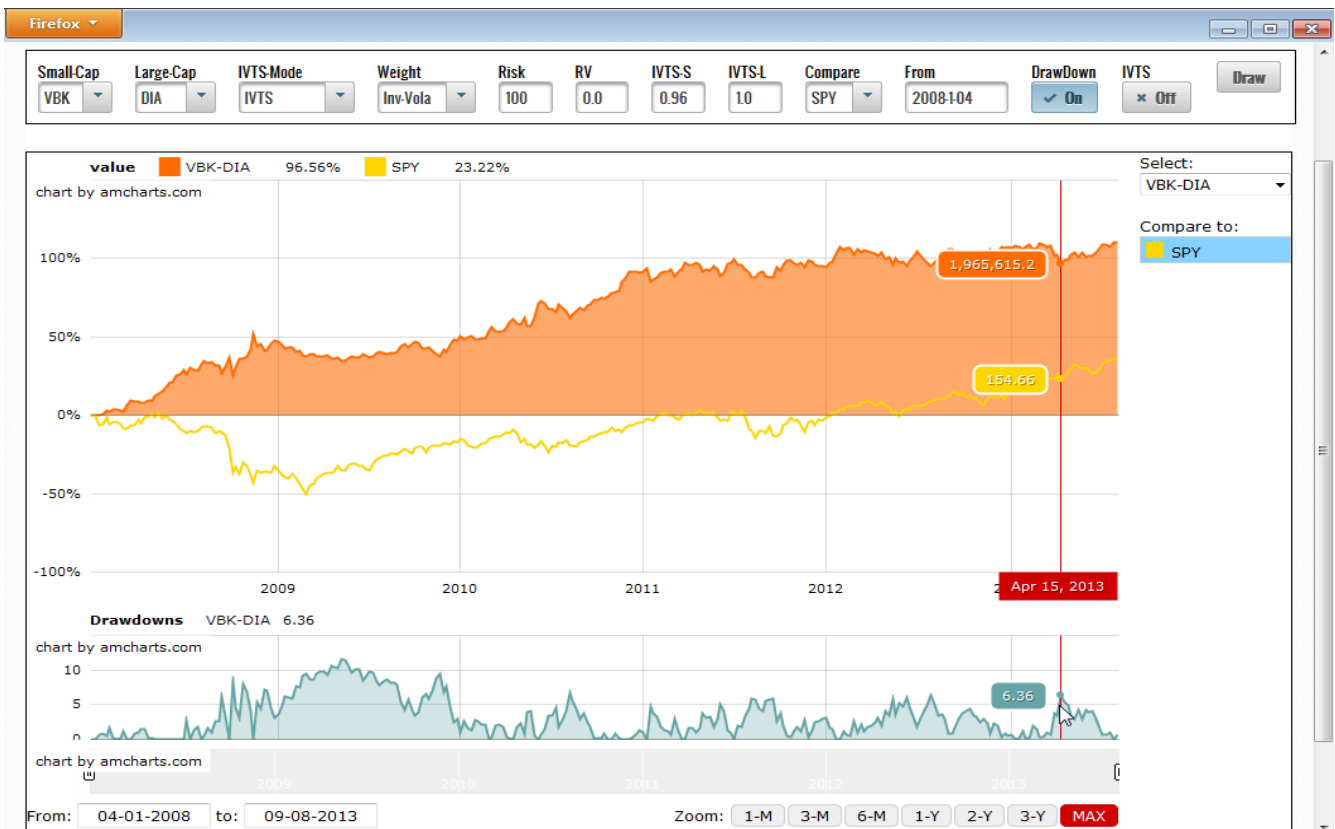
Graphic-3 displays the combination VBK v. DIA. The overall performance is somewhat better than with the VBK-SPY combination. The VBK-DIA snail wins over the whole period 110.30%. The performance is within the last year almost identical to the VBK v. SPY combination.

The best pair seems to be VBK v. OEF (S&P-100). The overall performance is 130%. This pair is also in the last year with 7.9% the best combination.

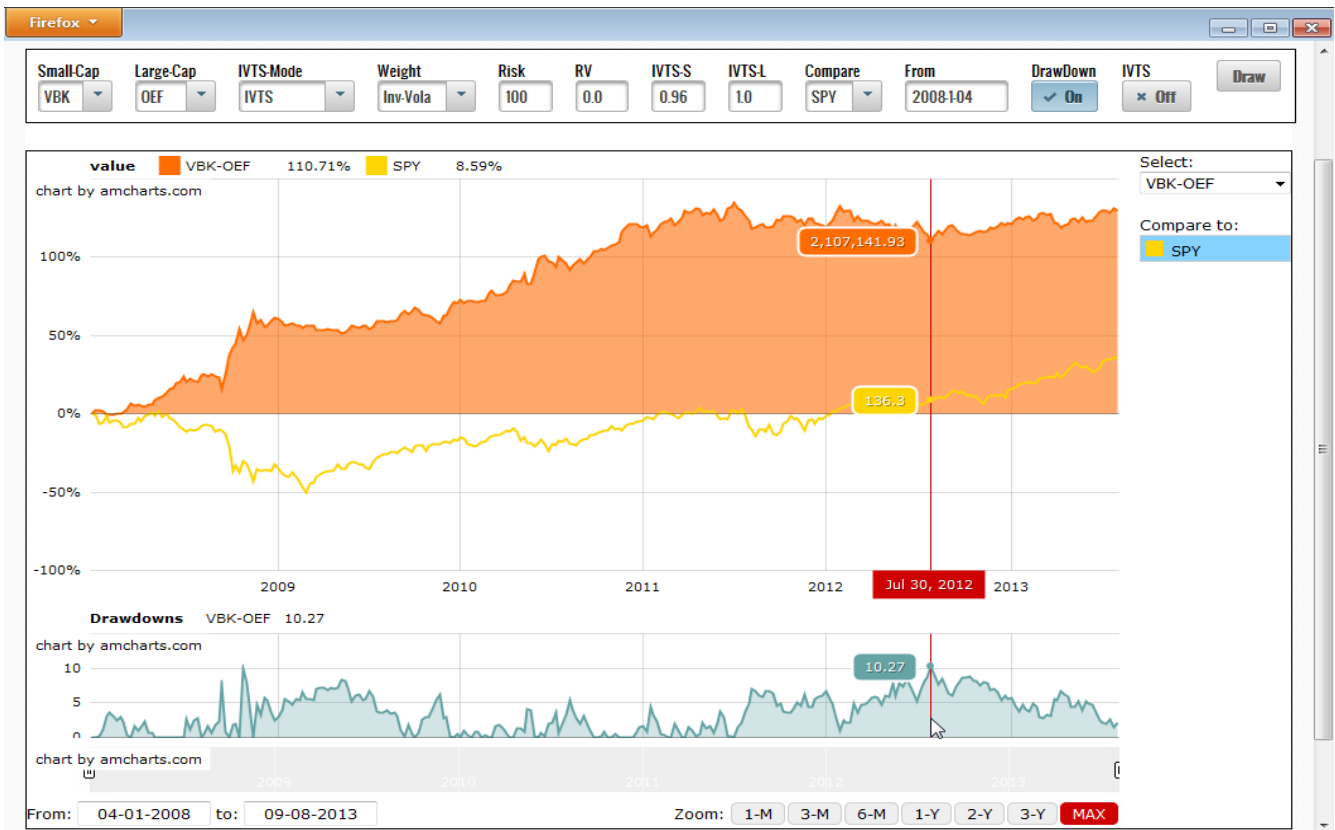
The large caps performed in the last 2 years too well. One could therefore think about to combine the VBK with a Large-Cap which is handicapped in its upwards movement. An interesting candidate is the PBP. The PBP tracks the CBOE Buy-Write covered call index. The VBK-PBP snail has indeed the best performance. It wins over the whole period 148% (Graphic-6) and is even within the last year on par with with SPY (Graphic-7). But this good performance is not for free. The max. relative Drawdown is much larger than for the other combinations. The performance is within the last year not smoother than the SPY. The PBP made in this time period almost no progress. The large gains of the SPY were capped by the covered calls. One trades essentially the long VBK. The advantage of the other combinations is the hedge due to the long-short combination. The VBK-PBP does not show this behavior. It excels during a nosedive phase, but it loses a great deal of this advantage in the following recovery.



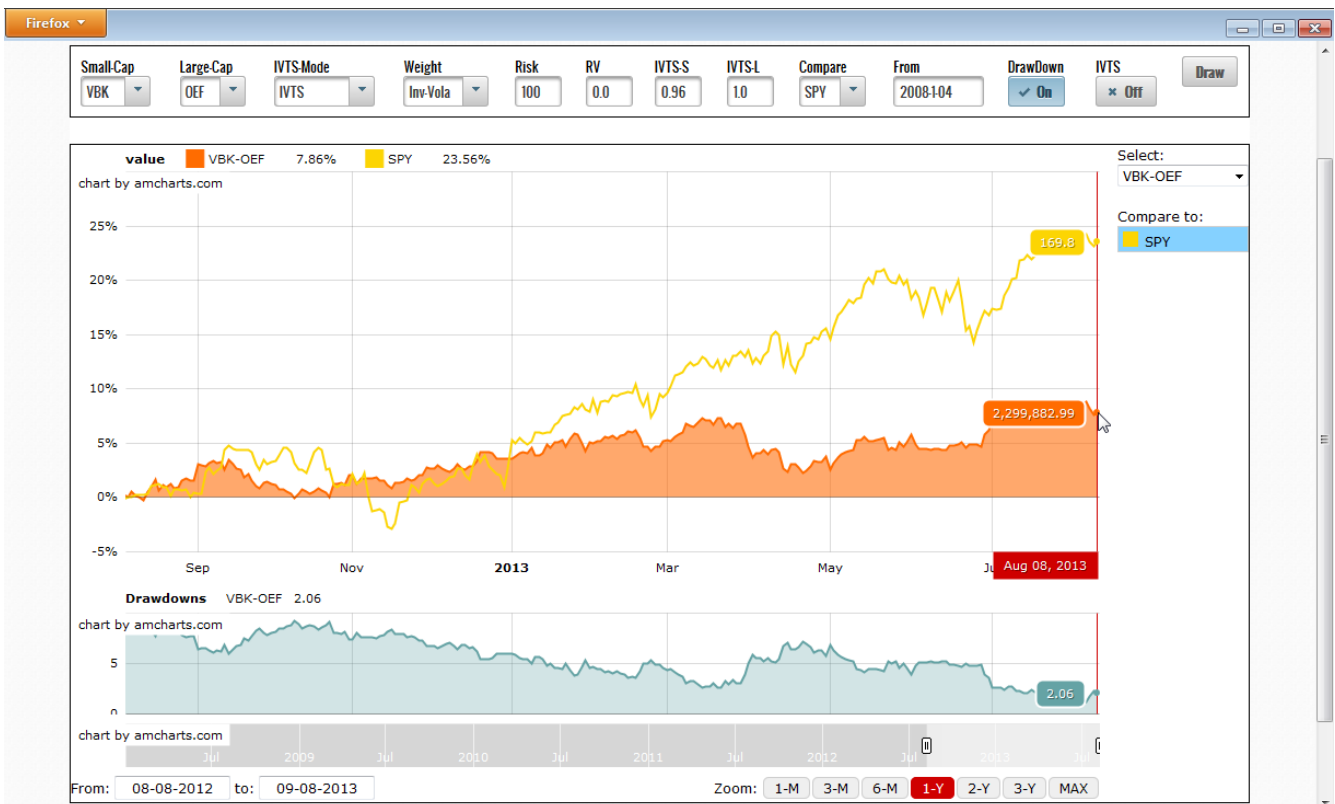
Graphic-2: VBK v. SPY, 2012-08-08 till 2013-08-08 (orange), SPY (yellow)



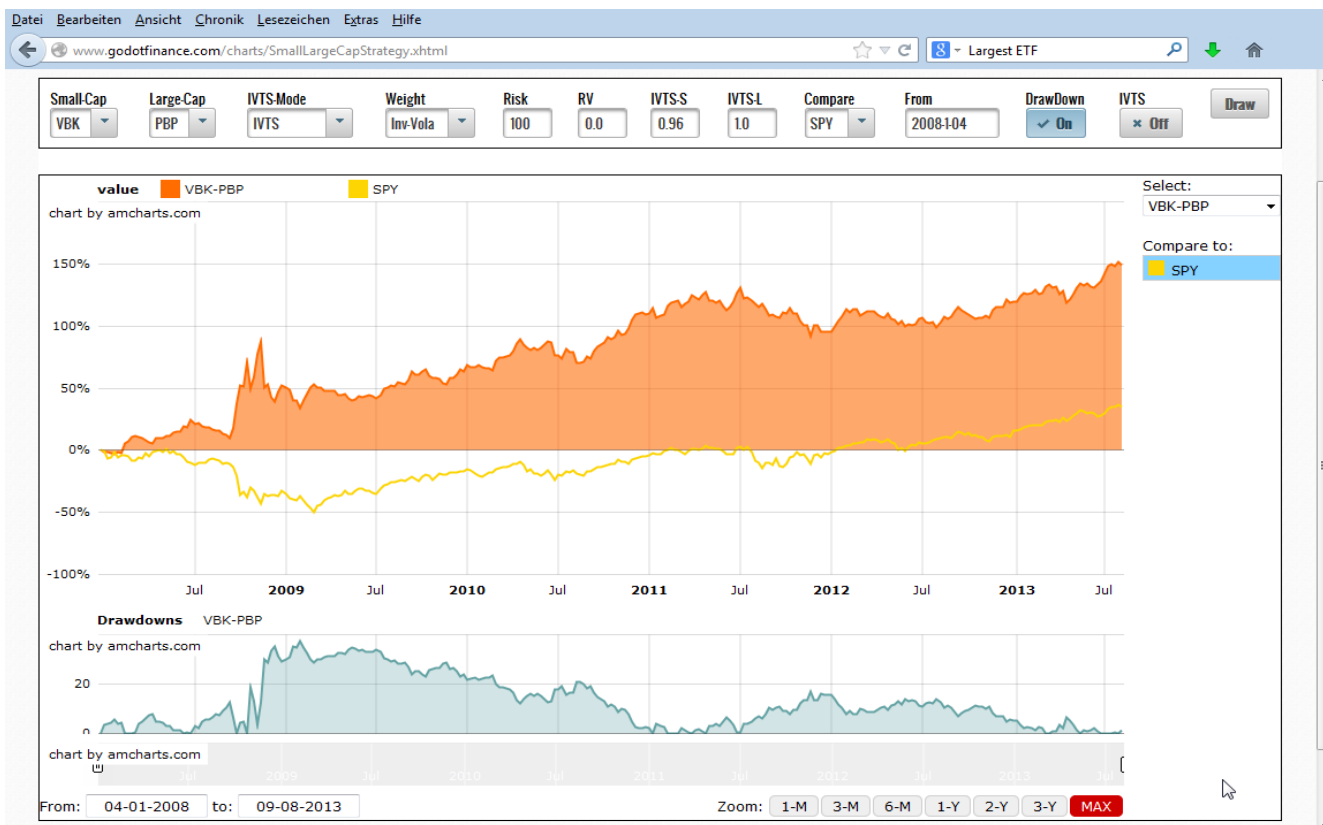
Graphic-3: VBK v. DIA, 2008-01-04 till 2013-08-08 (orange), SPY (yellow)



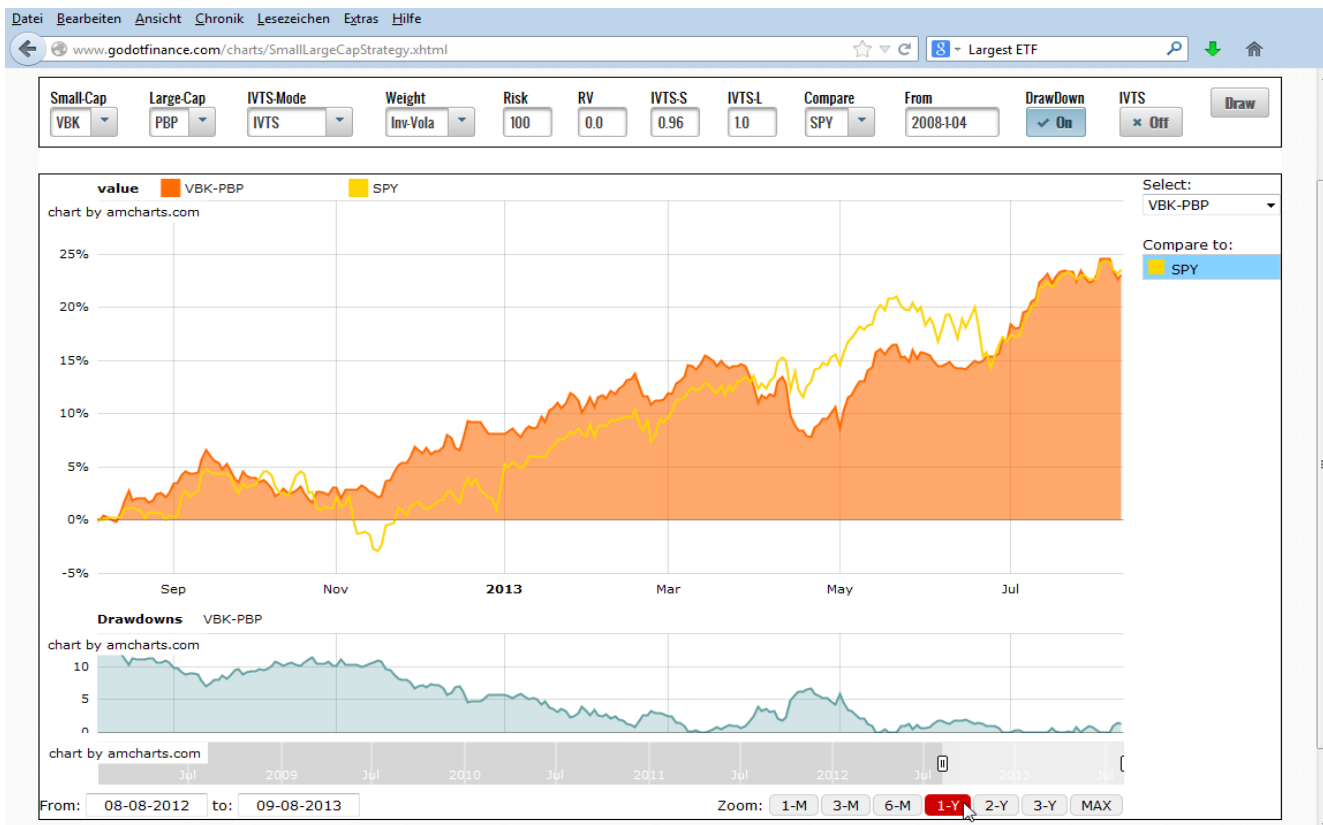
Graphic-4: VBK v. OEF, 2008-01-04 till 2013-08-08 (orange), SPY (yellow)



Graphic-5: VBK v. OEF, 2012-08-08 till 2013-08-08 (orange), SPY (yellow)



Graphic-6: VBK v. PBP, 2008-01-04 till 2013-08-08 (orange), SPY (yellow)

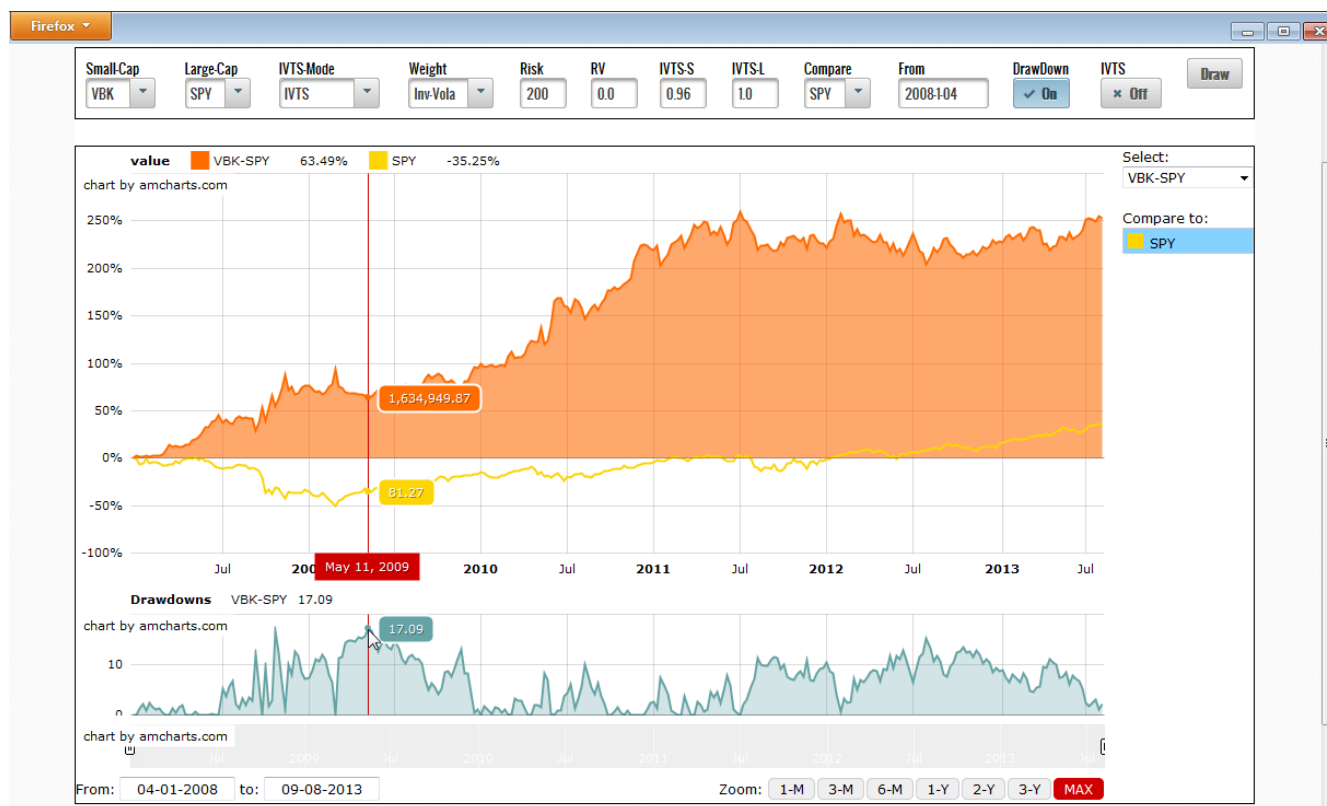


Graphic-7: VBK v. PBP, 2012-08-08 till 2013-08-08 (orange), SPY (yellow)

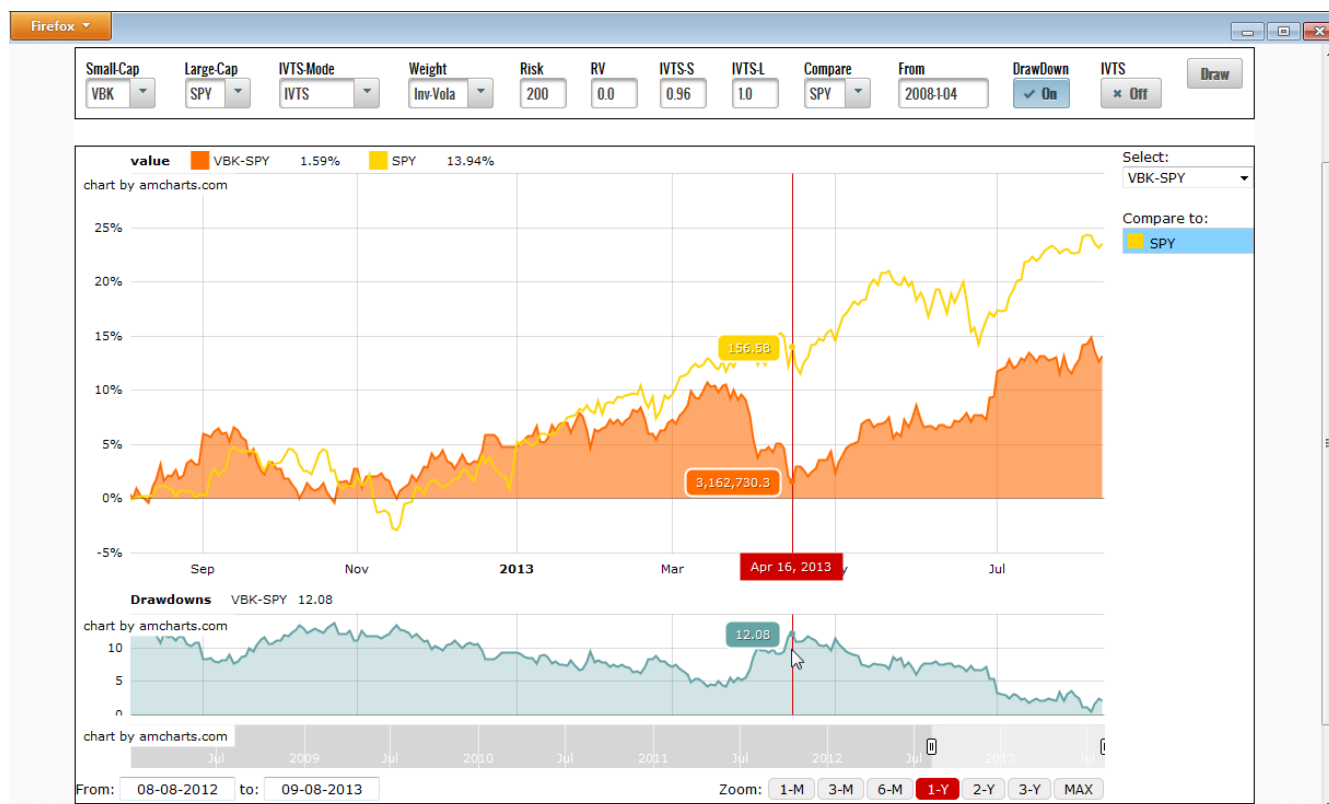
The lockstep between the VBK and the PBP is too less.

The Ultra Snail:

One can also leverage the position. Graphic-8 shows the performance of the VBK-SPY ultra snail. The weights in equation (2) and (3) are multiplied by 2. The VBK-SPY combination is for this purpose a good candidate, because it's performance is relative smooth. The VBK-DIA ultra is a reasonable alternative. The relative drawdown of the ultra snail still within acceptable bounds. The ultra snail wins over the whole period 252.2% and 13.1% within the last year (Graphic-9).



Graphic-8: VBK v. SPY, 2008-01-08 till 2013-08-08 (orange), SPY (yellow), 2x leverage



Graphic-9: VBK v. SPY, 2012-08-08 till 2013-08-08 (orange), SPY (yellow), 2x leverage

Conclusion:

The snail strategy is an interesting choice for a patient investor. Its performance is in the long run satisfactory. It shines especially in times of troubles. But within sharp rallies it is dwarfed by a long-only strategy. One can boost up performance with the ultra. This increases of course also the risk accordingly.

The IVTS does a good job to signal the different market regimes. The strategy suffers in recent time from the small margin between Small- and Large-Cap ETFs. Selecting a capped ETF like the PBP does not solve this problem. The snail needs 2 assets with a similar performance pattern.

References:

- [1] Ch. Donninger: Improving the S&P Dynamic VIX-Futures Strategy: The Mojito 2.0 Strategy. Sibyl-Working-Paper, Rev. 1, 2013.06.04
- [2] Ch. Donninger: Boosting the SPY with the VXX: The Daiquiri Strategy. Sibyl-Working-Paper, April 2013
- [3] Ch. Donninger: SPX-Options Trading: The Kir Strategy. Sibyl-Working-Paper, Rev. 2, 2013-03-08.
- [4] Ch. Donninger: A broad hint from the VIX: Timing the market with implied volatility. Sibyl-Working-Paper, April 2013.
- [5] Ch. Donninger: Chrilly's Complete Manual of Momentum Trading: The Donkey and Mule Strategies. Sibyl-Working-Paper, July 2013.
- [6] Dennis Yang, Qiang Zhang: Drift-Independent Volatility Estimation Based on High, Low, Open, and Close Prices.