Faced with the choice between changing one’s mind and proving that there is no need to do so, almost everyone gets busy on the proof.
(John Kenneth Galbraith)

Abstract:
This working-paper examines and improves a VIX-Futures calendar-spread strategy proposed in the literature. The strategy relies on the typical term-structure of VIX-futures. Additionally a naked short-selling strategy is considered. The strategies have similar characteristics to selling Puts on the S&P-500. There is some risk, but also a lot of fun. The strategies are an interesting alternative investment-vehicle to boost the performance of a fund.
The revision is a major rework of the original paper.

Introduction:
VIX-futures are a different beast. The VIX can not simply be replicated. Additionally the VIX is mean-reverting. The VIX volatility is almost an order higher than the S&P and explodes in a market-crash. Hence VIX-futures (and options) behave very different to commodity- or stock-index futures.
VIX-futures trade in normal times at a premium to the VIX. There is also a typical term-structure. The premium increases with maturity like the positive part of a logistic function. A nice discussion of the term structure can be found in [1]. A typical example of the term structure can be seen in graphic-1 (figure 7.2.1 in [1]). It shows the price of the Jan. (VXF11) and Feb.2011 (VXG11) Futures. If there are a few months till expiry the price is almost identical. As time goes by the spread between the two futures opens.
The term structure inverts in times of troubles. Graphic-2 shows the Aug. VXQ11 and Sept. 2011 VXU11 futures. As long as the VIX is in a modest range below 20, the VXQ11 is below the VXU1. But once the VIX spikes in summer 2011, the shorter maturity follows the VIX much faster.

R. Rhoads proposes in chap. 12 of [2] a simple calendar-spread strategy which is based on the normal term-structure. Sell with a maturity of 3-4 months the nearer future and go the next future long. The position is closed on Friday (5 days) before expiry. This trade would clearly be profitable in graphic-1. The spread widens constantly. In graphic-2 one is considerable punished by the inverted relation at the end. The strategy sells volatility insurance. It is similar to selling Puts. The second future hedges somewhat the risk. The strategy is – like all insurance-selling strategies – in the long run profitable. But there is no fun without risk.

Rhoads proposes a simple filter. One stays out of the market as long as the future-premium is negative. The filter improves risk (but not necessarily the overall win) somewhat. But it does not address the real problem. As can be seen in graphic-2 and 3 the real danger of a term-structure reversal is on the right side, near maturity. The VIX-spike in Aug. 2011 reverses the short-term structure of VXQ11 and VXU11. In case of VXZ11 and VXF12 the spread gets narrower, but the VXF12 trades always at a premium to VXZ11. A VXZ11-VXF12 calendar spread is during the summer-crash relative...
harmless. At the end the combination would make even a nice win. As long as there is enough time till expiry, there is some hope that one can dive through the wave. At the end of the contract one is certainly drowned.

Graphic-2: VXQ11 (yellow), VXU11 (green) and VIX (black) between 2011.03.01 and 2011.08.15
The Sidre-1 Strategy:

The Sidre-1 Strategy is an implementation of this idea. One enters with a maturity of N-days a calendar spread. The trade is only done if the near-term short future trades at a premium to the VIX. The relation of the second future is not considered directly. One waits as long as the condition is met. But the maturity must be at least 10-days. One defines additionally a danger-zone. Per default the danger zone is as long as the initial-maturity. But it can be shorter. A danger-zone of 0 corresponds to the strategy proposed by Rhoads in [2]. If the futures fall within the danger-zone below the VIX, the position is closed. The relation between the futures-price and the VIX is used as a stop-loss-trigger. Note that at this point the spread can be still a win. But usually the VIX starts to explode at this point and the position deteriorates very fast.

This strategy is done for every Calendar-Pair. If one selects a maturity of 90 days, up to 3 pairs can be open for trading. One has also to select the leverage. For calculating the performance, each pair gets a weight of 100/(2*maxOpenPairs). In case of 90 days (maxOpenPairs =3) the weight is 16.66%. If one has 100.000$ on the margin-account, one goes the first Future for 16.660$ short and the second for 16.660$ long. For a maturity of 60 days, there are a maximum of 2 pairs open and hence one would trade for 25.000$ each.
Graphic-4 shows the Performance of the best combination. The maturity is 60 days. The danger-zone is also set to 60 days. One stops the trade all the time if the future falls below the VIX (actually the VIX rises up faster). The green-line in the top panel shows a more conservative enter and stop-loss criterion. The future must trade at least at a 5% premium over the VIX.

The strategy starts at 2010.03.17. This is an arbitrary date I have used in previous working-papers. The starting date is unfavorable for the strategy. There were several VIX-spikes in the following months (e.g. the flash-crash).

The strategy wins in this time-period 17.1%. This is somewhat less than the SPY, but the drawdown and the volatility is considerably decreased. The Sidre-1 is due to the calendar-hedge and the stop-loss a relative conservative strategy.

The Sidre-1 is similar in spirit to the inverse S&P Short Term VIX-Futures Index and the corresponding ETF XIV. But in this case one performs a constant daily roll-over. There is no stop-loss-trigger and the XIV is higher leveraged. The XIV is much riskier than the Sidre. But the risk (and the fun) can be controlled by going the mid-term VIX-Term Structure ETF VXZ long. See [3] for further details.
The Sidre-2 strategy:

For the Sidre-2 strategy one chooses a 2 months calendar-spread. One goes e.g. the VXF11 short and the VXH11 long. This exploits the effect that the H11 is at expiry (or 5 days before) of F11 above G11. The final win is greater than for the Sidre-1. The initial difference is less pronounced. On the downside the H11 does not protect the F11 as well as the G11.

Graphic-5: Sidre-2 Strategy 2010.03.17 – 2012.08.10

Graphic-5 shows the performance of the Sidre-2 with the same parameters than for the Sidre-1 in Graphic-4. A 60-day maturity and a danger-zone from the beginning is also here the best. For the Sidre-2 the more conservative 5% premium-threshold does not pay at the end. But there is clearly less risk involved. The Sidre-2 wins over the whole period 37.2%.

But it should be noted that this wins are without trading costs. For each pair one has to pay 4-times the bid-ask spread (the broker-fees are negligible).

An obvious extension is the Sidre-3. Here the short and the long hedge are 3-months apart. This improves the result further to a win of 48.8%. But of course also the potential risk increases. See Graphic-6 and 7. The drawdown of Sidre-3 in April and May 2012 is clearly larger. During these months nothing special happened. Volatility just went up from the very low level of the previous rally. No stop-loss was triggered and the strategy just looses from the rising volatility. A simple SPY strategy would have lost too.
Graphic-6: Sidre-3 Strategy 2010.03.17 – 2012.08.10

Graphic-7: Performance Sidre-2 (brown) and Sidre-3 (green) in Apr/May 2012
The Most-Strategy:

“Most” is the traditional beverage of my home province Upper-Austria. We are called in other parts of Austria the “Most-Schaedl“ (Most-Heads). Most is in the view of the Most-Heads an honest, natural, earthy version of Sidre. It’s not for the fainthearted, only for real brave man. For the rest of the world traditional Most tastes like vinegar. In recent time Most has to the despair of the real Most-Schaedel deteriorated. Even Piefkes (the Austrian nickname for Krauts) are now able to drink it.

A typical Most-Schaedel has two favorite phrases “Is ja wurscht” (don't worry, be happy) and “Zuwas brauchma des” (Who needs anyway”).

Note: There was an article in the “New Yorker” about the Hydra project. The author devotes a whole paragraph to Chrilly’s “is ja wurscht”.

http://www.newyorker.com/archive/2005/12/12/051212fa_fact_mueller

A typical Most-Head would ask: Who needs the long future anyway. Is ja wurscht if one makes from time to time a heavy loss. In the long run one cashes in a lot of bucks. Probably Most-Heads have also immigrated to Chicago. The CBOE maintains the VIX Premium strategy index VPD and the Capped VIX premium strategy VPN.


The VPD goes a 30-days maturity VIX-future short and simply waits till expiry. There is no entry filter. The Capped Index buys additionally a far OTM VIX-Call. But the call seems to be too far away. The VPD and VPN have a very similar roller-coaster behavior.

Graphic-8: The VPD index Nov. 2007 till April 2012 (picture provided by Mats Person)

I have not found an ETF which implements the two indexes. The trade is probably too easy to warrant an ETF.

The Most-Strategy is the VPD enhanced by the VIX-trigger.

The strategy is similar to selling naked SPX OTM-Puts. The profit is especially for the 60-day maturity parameter quite impressive.
Graphic-9: Most (brown) and Sidre-3 (green) 2010.03.17 to 2012.08.10

Graphic-10: Most (brown) and Sidre-green April/May 2012
The Most dwarfs even the Sidre-3. The final win is 124.1%. But also the drawdown is considerable. One is in July 2010 5% under the water. The Most looses in April/May 2012 18%. The trading cost of the Most are only half of the Sidre. It should have also an edge for margin-requirements. Although the calendar-spread reduces the risk, margin-requirements usually do not accredit this fact. The much riskier naked Most-Futures has lower margins than the Sidre-pair. But for a trading strategy one has to take the high risk of the Most into account.

Conclusion:

Using the future-premium trigger improves the strategies considerable. In case of the Most one can't trade it without such a trigger. I have also experimented with a stop-loss based on the loss of the position. The premium criterion is obviously superior. It measures in a very simple way the underlying dynamic.

The Sidre is a relative sound strategy. The losses are even under stress test conditions modest. But the profitability depends in a critical way on the round trip costs. There are always 4 trades involved.

The Most is more risk and most fun. The trigger is especially effective. In times of a high VIX one stays out of the market. The bid-ask spread is for the Most a minor issue. One has only 1 or 2 trades per position and the P&L per trade is much higher.

V. Lindow implements in [1] the calendar-strategy with sophisticated forecast methods for the VIX-futures. Her results are also encouraging. The big advantage of the presented strategies is: they are KISS. No calculation is needed, one sees at a glance if one should enter or leave the position.

References: