Crude Contango

- What is contango and when does it happen in crude futures?
- How does contango affect USO, and does USO affect the curve?
- How can we trade the contango?

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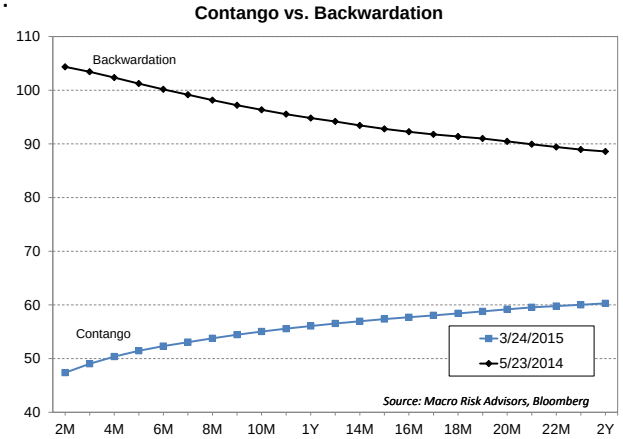
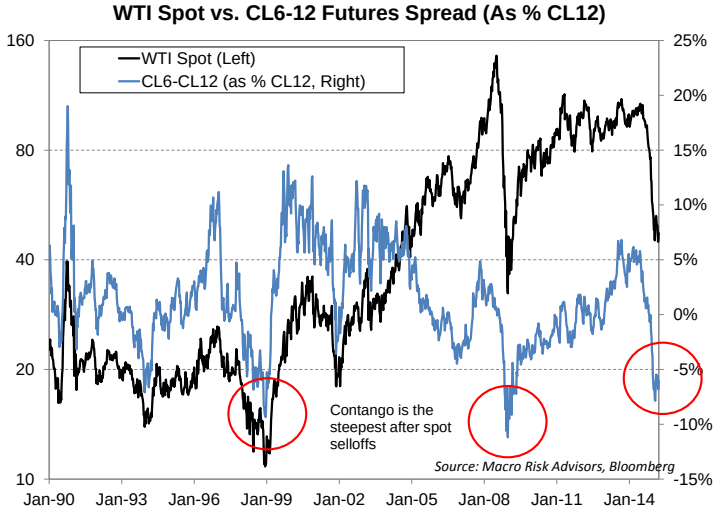
What is contango?

Contango means longer-dated futures trade at a higher price than near-dated futures. In other words, it costs more money to buy something delivered in the future than today. If this is the case, why not buy it today and sell it forward, locking in a sure profit? The answer, in the case of WTI crude, is that it costs money to store those barrels of oil. Of course, this is oversimplified - rates and supply/demand affect prices as well. But fundamentally – whether it be crude oil, VIX, FX, or rates – the **cost of carry** is what makes a curve upward-sloping (or in **contango**), while immediate demand can drive up the front end, causing inversion (or **backwardation**).



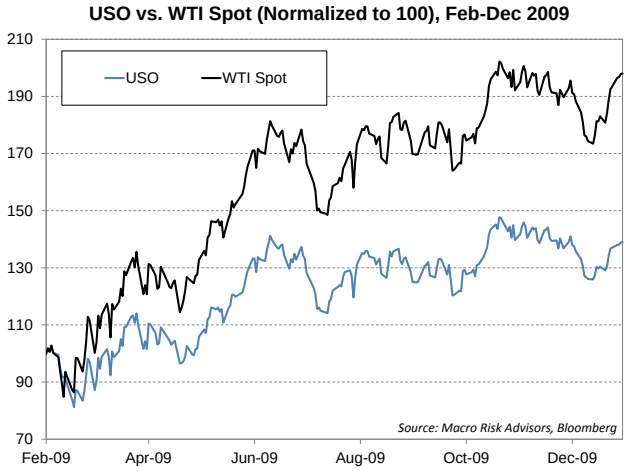
Historically, we see the steepest contango after oil crashes, and the steepest inversion when oil rallies. A simple way of thinking about this is that **the front end is more reactive than the back end.** A sudden spike in demand drives up front month futures, flattening the curve (and vice versa). Most importantly, in crude, the curve can be **in contango or backwardation for long periods of time** – there is no "normal" state of the world.

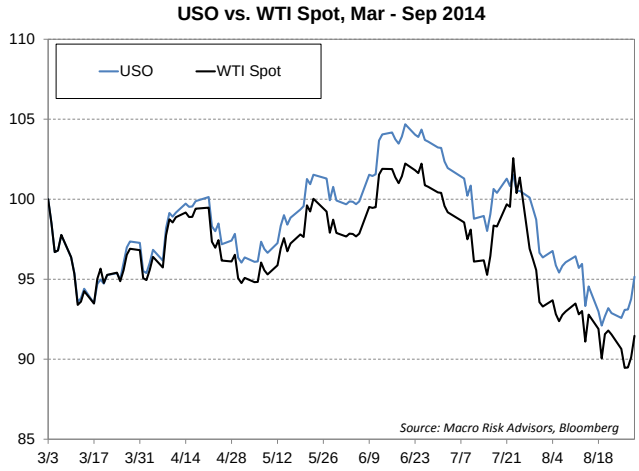


How does contango affect USO?

USO is by far the most popular crude oil ETF by market cap and volume traded. USO owns the front month WTI Crude "CL" future and rolls to the next month future on a predetermined schedule – typically over 4 days, starting 2 weeks before front month futures expiry.

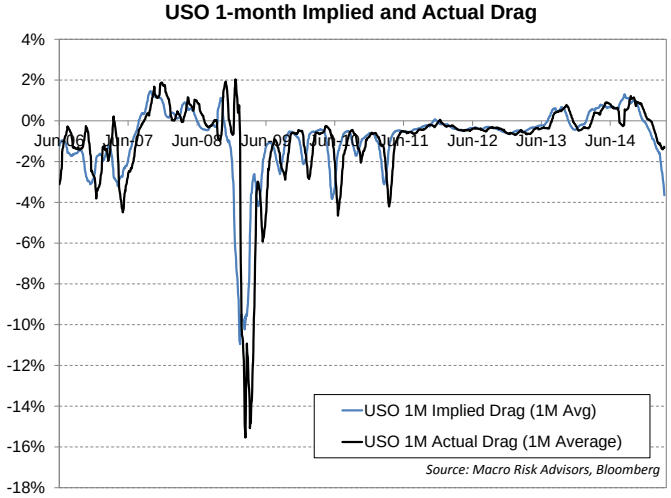
When the curve is upward sloping, USO faces a headwind – **as does any investor that is long futures in an upwards sloping curve.** There is nothing "flawed" about USO's particular strategy or even the fact that the roll dates are published in advance. The headwind is the cost baked into the futures curve. Below, we chart two examples where USO underperformed and outperformed spot crude due to contango/backwardation. Of course, **contango does not mean USO has to go down.** It is just an extra cost long investors must pay.





Imagine USO is about to roll from the May futures to the June futures. If we think the crude curve will be in the exact same place a month from now when we roll again, that means the June future will have declined in price. Thus, the percentage difference between CL1/CL2 gives us an estimate of the 1 month drag. Below, we chart the implied and actual 1-month drag for USO since 2006. This shows the futures curve is generally a good predictor of the actual drag affecting USO. The other takeaway is that **the spread is volatile** and it is naïve to extrapolate a contango drag out more than one month.

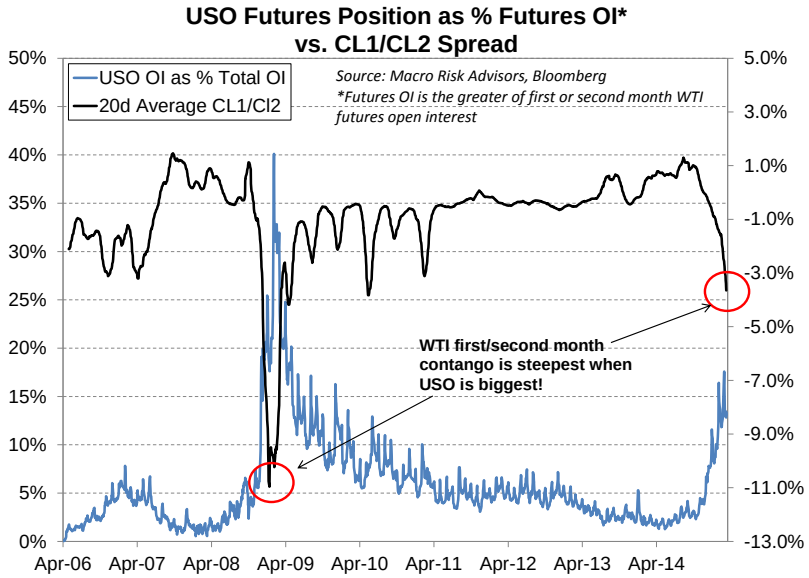
Future	Price	Diff %
May 15	47.73	-3.3%
June 15	49.34	



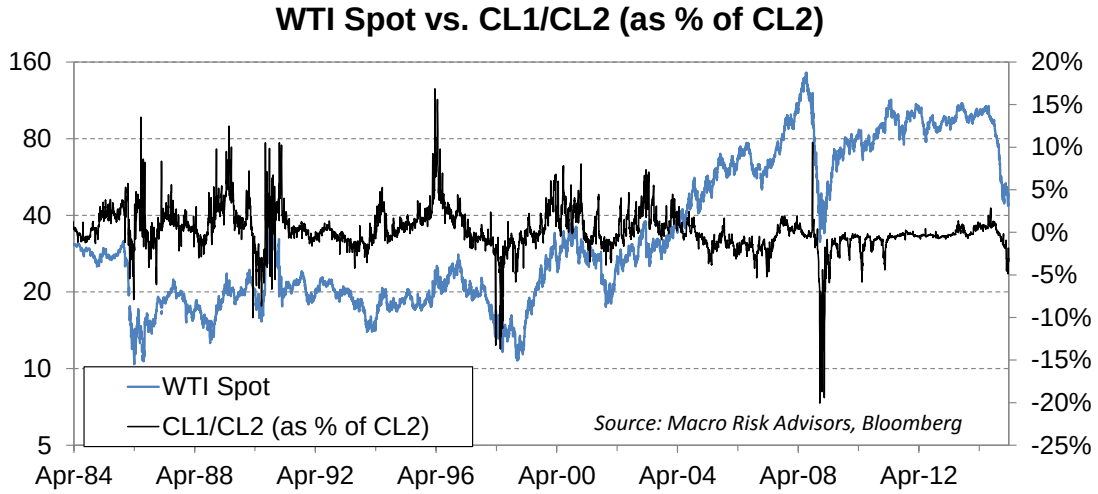
Does USO affect the contango?

USO first went listed in April 2006, and saw massive growth as crude oil sold off in late 2008, with its futures position reaching 40% of the total open interest of front month futures. As the chart below shows, the 1m/2m crude futures spread has seen extreme steepening when USO gets large. In the past few months, we have again seen massive inflow into USO: since July 2014, it has attracted $3.2 billion of inflow.

The market is aware of the futures roll that USO must execute every 2 weeks. This anticipated future demand for the next month future is what steepens the curve as USO attracts more money. In other words, the problem is with the **amount of money rolling front month futures**, not USO itself.



However, we also know that the curve steepens whenever crude oil sells off – might this be a chicken and egg problem? We can look at the CL1/CL2 futures spread (as a % of CL2) going all the way back to 1980, and compare it to spot WTI. Prior to the introduction of USO in 2006, the 1m/2m contango was never as extreme as '08, even during the 1985-1986 selloff of similar magnitude.

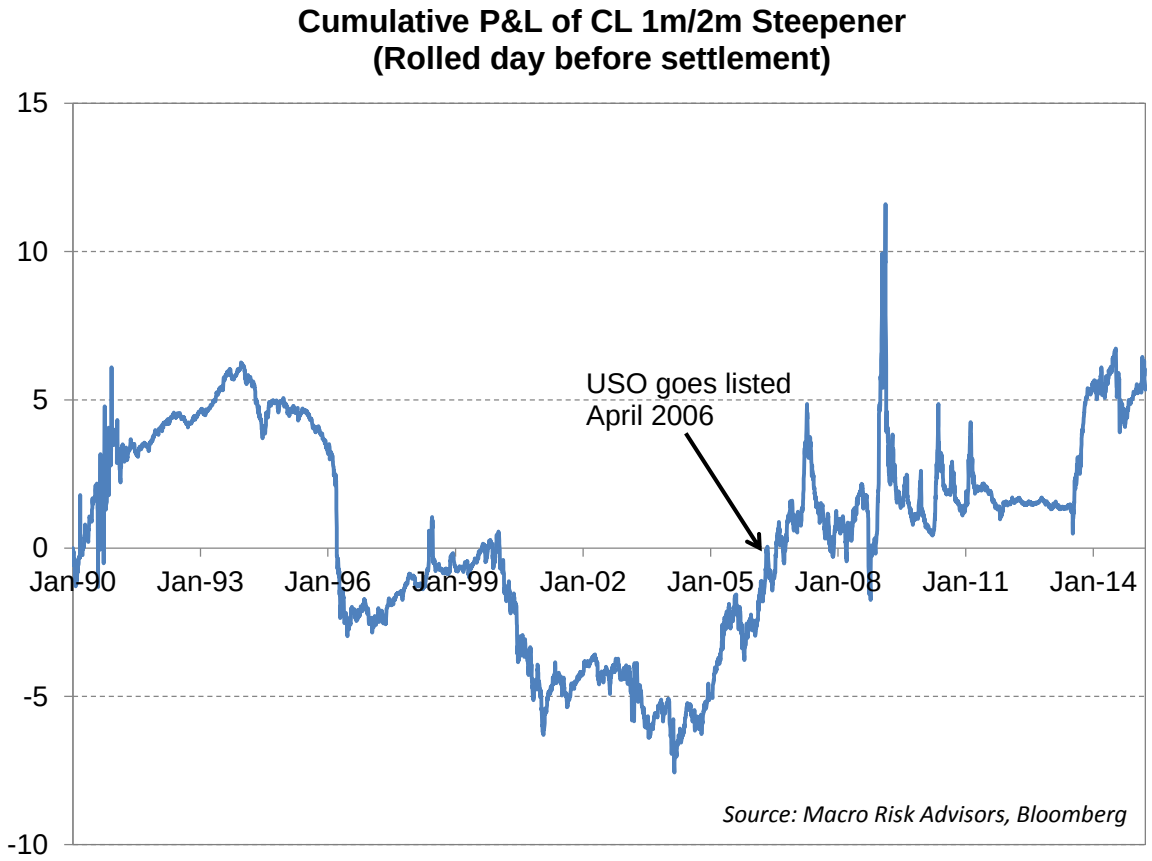


How can we trade the contango?
If we want to earn the contango "decay", then naively, we could short WTI crude futures in the expectation that they roll down the curve. Of course, this would put us at risk to 1) crude rallying or 2) the curve changing shape. As the chart on the last page shows, even when the curve is in steep contango (as in 2009) you can definitely lose money shorting crude futures or USO.

The Steepener ("Bear Spread")
Alternately, we could short a near month future and buy a back month future, expecting the spread to steepen out as it rolls down the curve, while protecting us against the absolute level of futures. Below, we backtest a couple trades, charting the cumulative P&L in futures points.

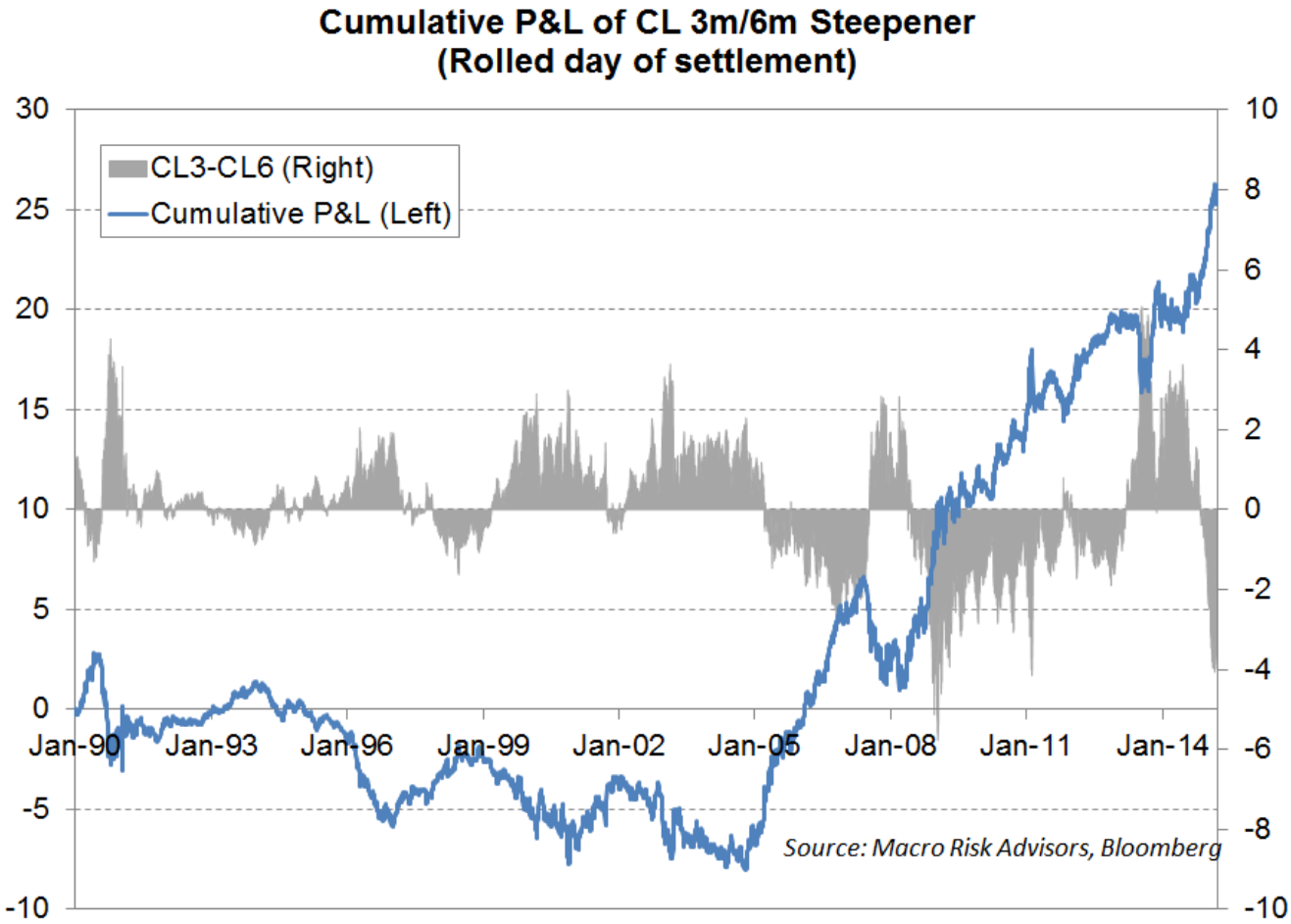
Short 1M Future / Long 2M Future (Roll 1 day before futures expiry)
This is not for the faint of heart. As we can see, it is extremely volatile and is less of a "rolldown" trade than a directional bet on the steepness of the very front end of the curve.

The other interesting point is that this trade has gotten much more volatile since USO was listed – faster steepening and reversion. Of course, this coincided with a more volatile period in the markets (compared to the 1990s).



Short 3M Future / Long 6M Future (Roll on the day of expiry)

This trade is less volatile than 1M/2M, and more what we want – earning the "roll" down the curve without exposure to the volatile front end. As we can see, it has made money in the generally contangoed curve we have seen since 2005. Interestingly, even the P&L of 2M/3M looks similar, suggesting we should generally stay away from direct exposure to the front month future in "rolldown" trades.



Conclusion

We've only scratched the surface of futures curve trading – other strategies to consider might be a back month steepener (as above) together with a small amount of front month flatteners, on a ratio.

Contango has a demonstrable effect on investors who want to be long crude oil through the futures or ETFs that hold the futures, such as USO. Contango does not mean crude futures or USO have to go down – it is simply a cost that must be factored into longs, and a tailwind for shorts.

While the backtested trade above has tended to make money, this is a consequence of a crude curve that has been in contango for most of the past several years. As the 1990s show, there is no guarantee the curve will stay this shape forever.