

Crude-Oil Extraction Resurgence in the United States?: No

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Introduction

Many news stories imply that there is a resurgent in crude-oil extraction in the United States. E.g., see [Oil Industry Booms – in North Dakota](#). I use the Energy Information Agency [extraction](#) and [reserves](#) data for crude oil for the six states (TX, ND, OK, UT, CO, NM) that have been having a rise in extraction to show that the “resurgence” is minor compared to the decline that has been underway since 1975.

Verhulst Function for Depletion Analyses

The depletion curve that I use to fit the data is the Verhulst function (<http://www.roperld.com/science/minerals/VerhulstFunction.htm>):

$$P(t) = \frac{Q_{\infty}}{n\tau} \frac{(2^n - 1) \exp\left(\frac{t - t_{1/2}}{\tau}\right)}{\left[1 + (2^n - 1) \exp\left(\frac{t - t_{1/2}}{\tau}\right)\right]^{\frac{n+1}{n}}}$$

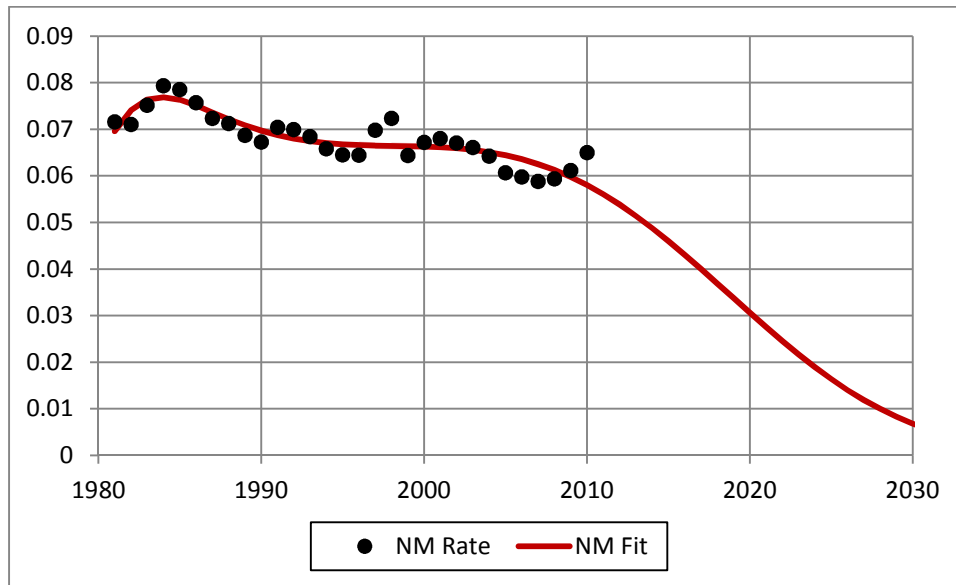
Q_{∞} is the amount to be eventually extracted, τ is the rising exponential time constant, $n\tau$ is the declining exponential time constant and $t_{1/2}$ is the time at which the resource is one-half depleted. The

maximum of $P(t)$ occurs at $t_{\max} = t_{1/2} + \tau \ln\left(\frac{n}{2^n - 1}\right)$, which yields $P_{\max}(t_{\max}) = \frac{Q_{\infty}}{\tau} \frac{1}{(n+1)^{\frac{n+1}{n}}}$.

Depletion Fits to Recent Data for Five States

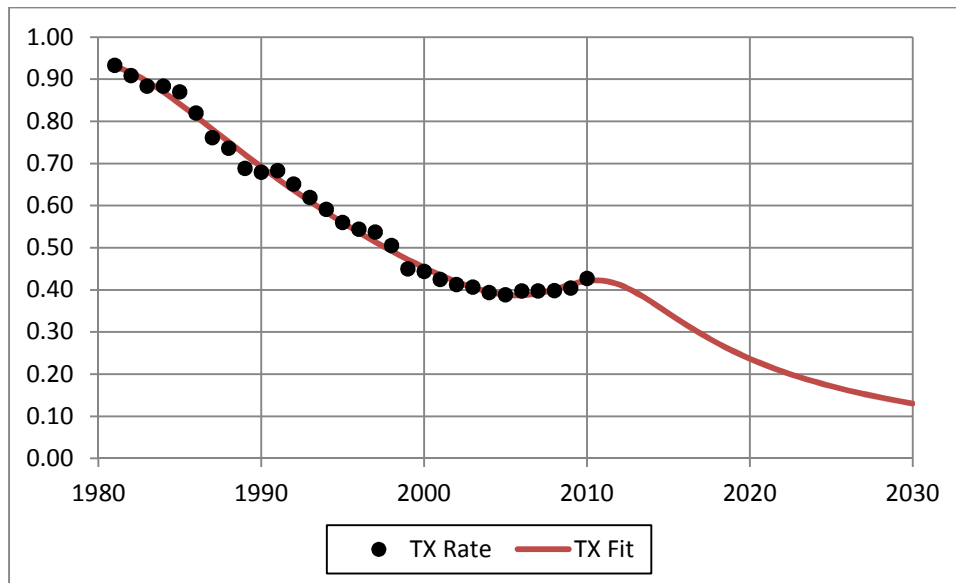
[Recent EIA data](#) for the states of the U.S. show that there has been a rise in crude-oil production in six states: TX, ND, OK, UT, CO, NM. The data are yearly extraction rates (units of 10^9 barrels/year) from 1981 to 2010 and estimated reserves in 2009. Using the Verhulst function to fit the extraction rates constrained by the estimated reserves, the following results are obtained:

The recent rise in NM is seen to be a short-term situation:

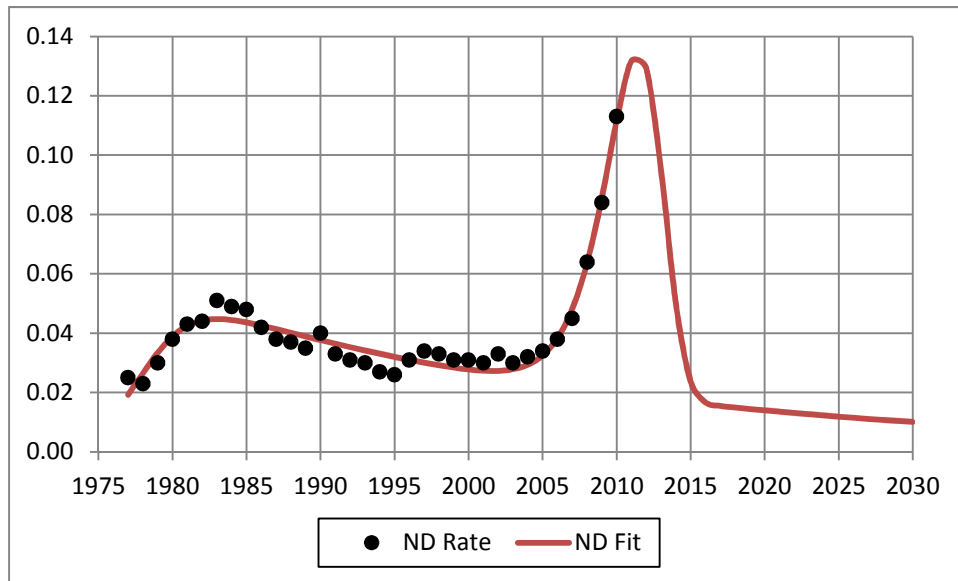


So we drop consideration for NM.

The fit for TX is:

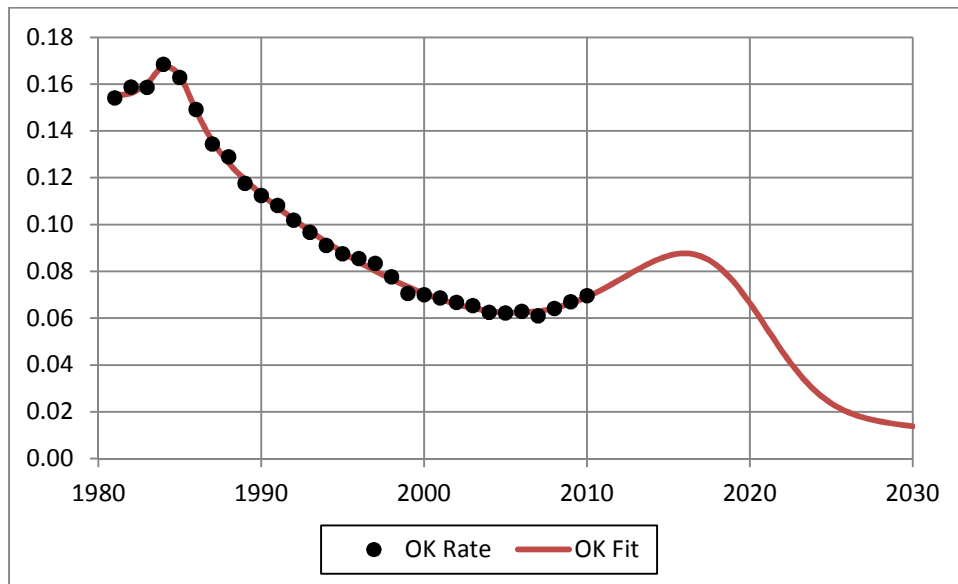


The fit for ND is:

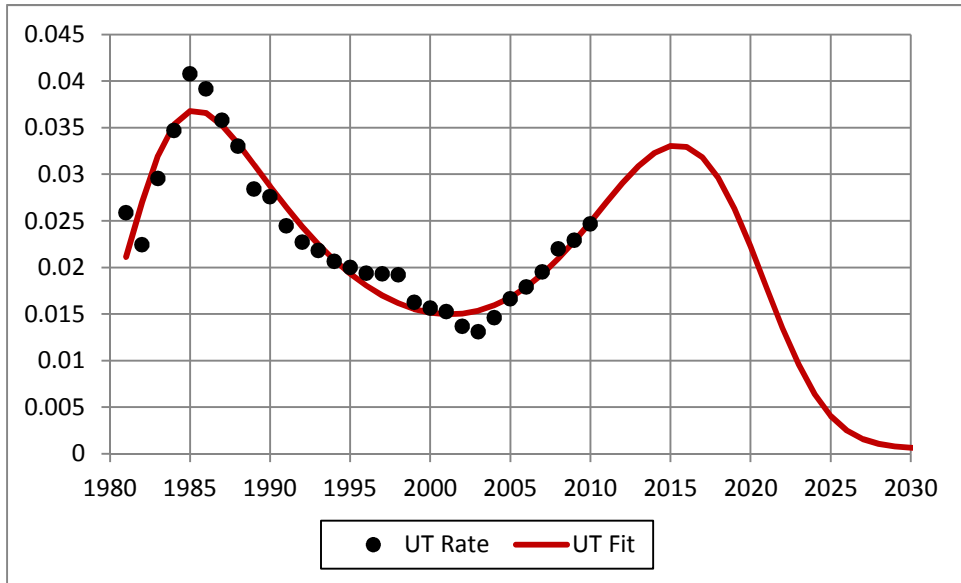


<http://www.fcnp.com/commentary/national/11418-the-peak-oil-crisis-parsing-the-bakken-.html>

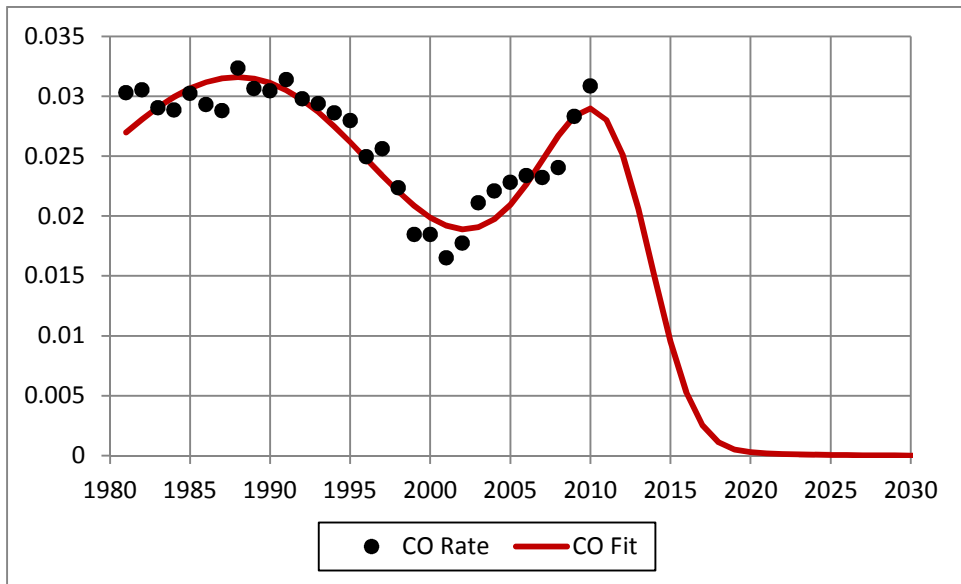
The fit for OK is:



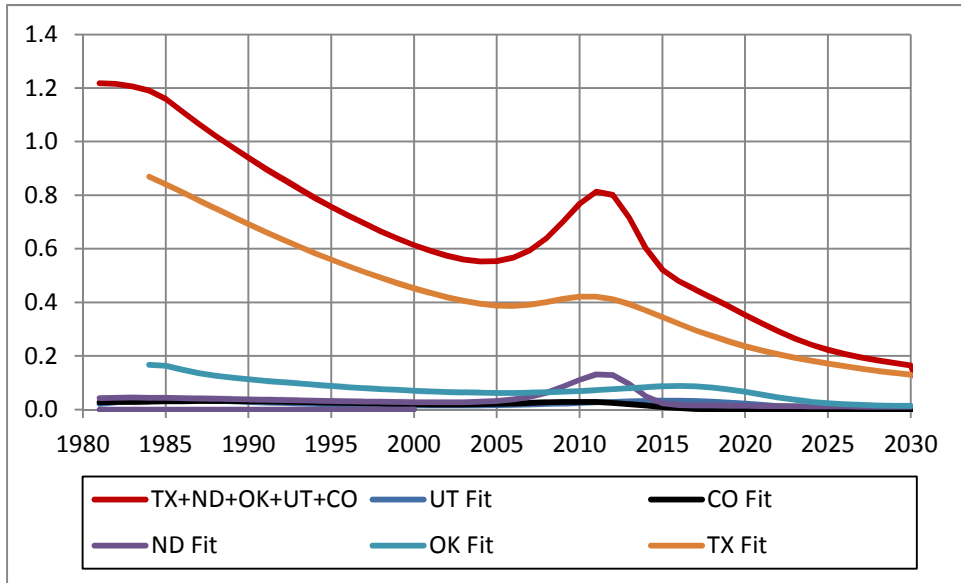
The fit for UT is:



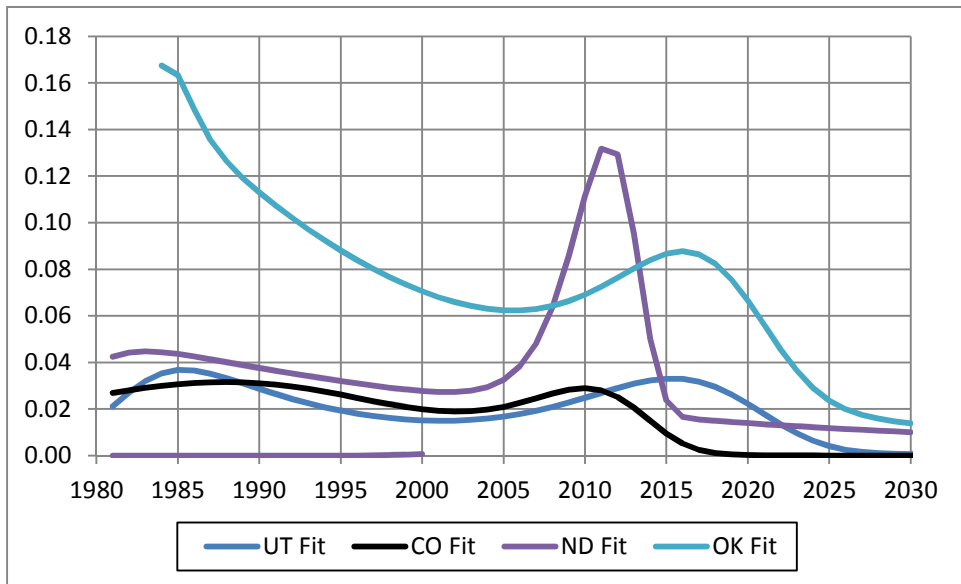
The fit for CO is:



Putting all five together:

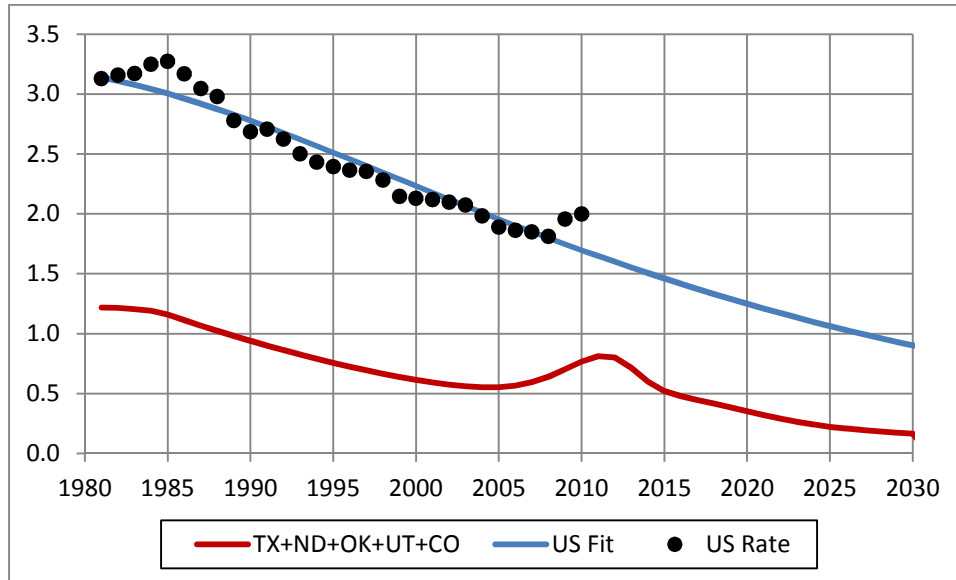


Excluding TX:

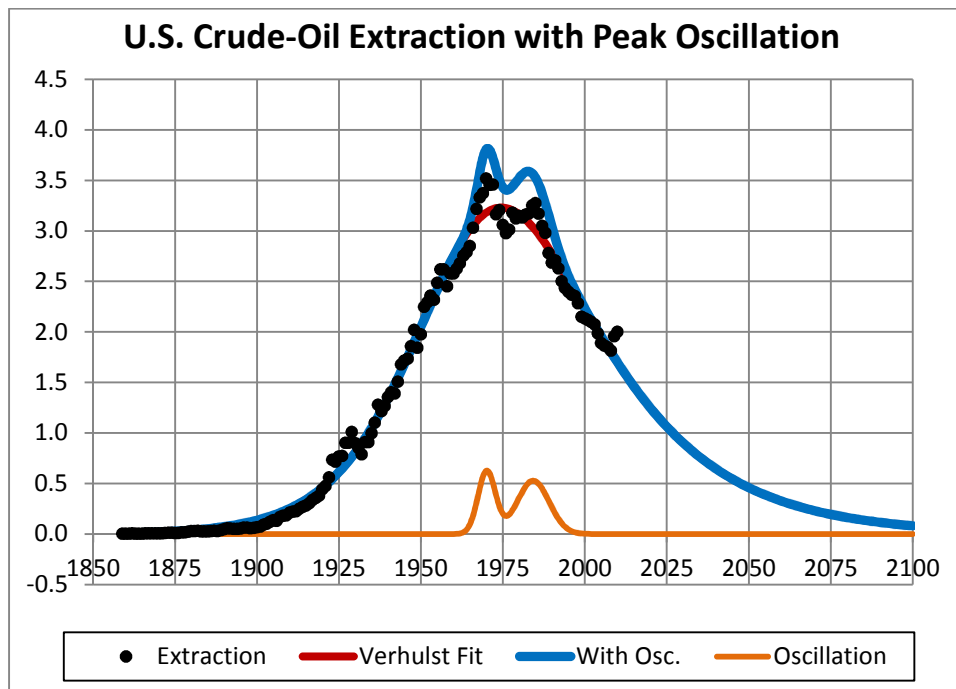


Conclusion

Comparing to total U.S. crude-oil extraction:



We see that the recent rises in crude-oil extraction for these five states is a minor blip on the overall U.S. extraction, similar to the two blips just before and after the 1975 peak:



There is no resurgence in crude-oil extraction in the United states.