

How fracking could cushion oil price shocks

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Fracking, or the extraction of oil and gas from shale rock formations, is suddenly more attractive with the surge in oil prices fueled by Russia's

invasion of Ukraine. The conflict threatens disruption of natural gas flows from Ukraine to Europe, while oil companies with interests in Russia could be caught in the crossfire of sanctions by the U.S. and European countries. A recent research paper by experts at Wharton and elsewhere titled "A World Equilibrium Model of the Oil Market" makes the business case for fracking as a viable mitigating factor to soften the impact of oil and gas price shocks.

New investment in oil fields is typically demand-driven, and not driven by supply shocks such as those that could occur with the Russia-Ukraine conflict, according to Wharton finance professor Gideon Bornstein, who co-authored the paper with Stockholm University economics professor Per Krusell and Northwestern University finance professor Sergio Rebelo. He did not expect conventional oil firms to invest in new oil fields as a response to the "short-term" supply shocks resulting from the conflict.

"Investment in oil is very volatile," said Bornstein, adding that it increases when [oil prices](#) are high and falls when they are low. "But we also saw in our data that it is very hard for conventional, non-fracking oil fields to change the amount of oil they [can extract] in the short run. To get more oil out from the ground, you either need to increase the extraction rate from your existing fields, which is very hard to adjust [to market changes], or you have to invest in more oil fields or more oil wells." It takes an average of 12 years after the initial investment for new oil fields to begin producing, he added.

In contrast, fracking offers much more flexibility than conventional oil production. "With fracking, within one year, you can invest and have oil running out," said Bornstein. "Secondly, with fracking, it is very easy to shut down or increase the amount that you produce."

"Fracking weakens the OPEC cartel, leading to a large, long-run decline

in oil [prices](#)," the researchers wrote in their paper. Fracking also reduces the volatility of oil prices in the long run because fracking firms can respond more quickly to changes in oil demand, they added.

The paper cited data on the number of oil rigs operating in the U.S. to demonstrate the flexibility that fracking offers. Between January 2009 and September 2014, oil prices rose from \$42 dollars to \$93 dollars a barrel, while the number of oil rigs in operation increased from 345 to 1,600. But over the next two years as oil prices plummeted to \$30 a barrel, the number of rigs in operation fell to 400. "Most of the new rigs are likely to have been used in fracking operations," the paper contended.

The paper's authors arrived at their findings on the macroeconomic impact of fracking by building a model that analyzed new and comprehensive micro data on oil fields. "Our model ... accounts for the high correlation between real oil prices and real investment in the oil industry," they stated. The data covered some 14,000 [oil fields](#) operated by 3,200 companies across 109 countries; the sample covers the period between 1970 and 2019.

According to Bornstein, "the main contribution of the paper is our ability to look at the data to quantify what people have been talking about, and documenting how hard it is for conventional technologies to change the amount of oil production in the short run and how easy it is for the fracking field." The paper does not consider the potential environmental effects of fracking, which have been controversial.

Based on the model in the paper, fracking reduces the long-run volatility of oil prices and world oil production by 42% and 33%, respectively. The average level of oil prices falls because the oil production of both fracking firms and OPEC increases. At the same time, the volatility of world real GDP rises by 3.5%. That rise occurs because fracking allows

the economy to be more responsive to productivity shocks, the paper explained. "Without fracking, a positive productivity shock raises oil prices, which dampens the effect of the productivity shock. With fracking, oil supply is more elastic, which amplifies the effect of productivity shocks."

"In a world where fracking is a big player, oil price volatility will be lower," said Bornstein. He argued that without the availability of fracking as a mitigator, "the Russia-Ukraine [conflict] potentially would have increased oil prices even more" than it has in the past few days. "Knowing that fracking is a major player can mitigate some of the rise in oil prices that we would have seen otherwise."

How high could oil prices go with the Russia-Ukraine conflict?

According to a Platts report, "under a limited incursion scenario which triggers Western sanctions impacting some oil flows out of Russia," Brent prices could cross \$100 a barrel but then retreat later. On Monday, Brent crude reached a high of \$105.07 in early trading.

What is less clear is the oil price level that would trigger new investments in fracking because the economics vary by region. When oil prices last week touched \$90 a barrel—the highest in seven years—shale oil drilling was "becoming more feasible even in places like Kansas and Utah, where wells produce far less oil than prolific fields in Texas and New Mexico," according to the Wall Street Journal report cited earlier. In the Andarko Basin that stretches across Oklahoma, Texas, Kansas, and Colorado, price levels of \$60 or \$70 a barrel were attractive enough for some fracking companies to make new investments in drilling rigs, the report noted.

"It's just very uncertain to understand what that [trigger-price] threshold would be" for fracking to become profitable enough to attract new investments, said Bornstein. "That threshold will go down over time as

we become more effective in using [fracking](#) technology."

More information: Gideon Bornstein et al, A World Equilibrium Model of the Oil Market (2017). [DOI: 10.3386/w23423](https://doi.org/10.3386/w23423)

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