Expanding Oil Supplies

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Expanding conventional and unconventional oil supplies in the United States and internationally sounds, at first glance, like a very logical thing to do. It potentially would lower world oil prices and increase resilience to disruptions and shocks, with likely environmental consequences the chief concern. Both economic theory and experience suggest caution, however. For expanded oil supplies to improve world output and economic well-being, their market value would have to exceed the total resources consumed in their exploration, development, production, and distribution. Given the size, sophistication, and capital of oil companies around the world, it is reasonable to first ask why oil production has not expanded more already, raising doubts about whether—in the United States, at least—the expectation of increased output, and thereby its economic benefit, may not be misplaced. Higher oil prices encourage such expansion. But the proposition that oil supply expansion can be stimulated through policy intervention deserves careful scrutiny.

What, then, is the economic rationale for intervening in oil markets? Is it because policymakers have better forecasts than oil companies? This is possible during a crisis, when government intelligence may help in deciding whether to use strategic reserves, but is implausible in the long run. Or is there some reason why the market price of oil does not reflect the true value of new supply? There are three potential reasons why the social value of additional oil and its price may differ: increased production may lower the world oil price, increased production may enhance resilience to supply disruptions and price shocks, and increased production risks environmental harm.

Limits of Intervention

Both conventional crude and unconventionally derived supplies (coal-to-liquids, for example) enter the world oil pool and thereby exert price impacts through the global market. A substantial increase in world oil production will lower world oil prices. However, the lower oil prices that would result will aid economic well-being only if the benefits exceed the resources consumed in producing an incremental barrel.

There is a second reason why the oil market might not yield outcomes that maximize economic well-being. Government regulation may prevent exploration and development of oil

reserves in areas where oil can be produced economically but are off limits due to environmental concerns.

Many governments do not allow access to foreign reserves that could be produced economically. Were governments in low production-cost regions, like the Middle East, to allow free access to the private sector, world economic well-being would improve through lowering production costs. But then diversity would decline, and the oil industries of high-cost countries—such as the United States, Canada, the United Kingdom, and Norway—might well disappear.

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Some countries that might want to encourage exploration cannot attract foreign capital because of the perceived threat that foreign firms may be expropriated. Many oil-producing countries have unilaterally changed the contract and/or fiscal terms under which foreign firms operate, and such political risk deters oil investment. This problem is potentially present whenever governments play a major role in a market. Addressing this problem through subsidized political-risk insurance, for example, could enhance oil production and welfare.

Indeed, the United States, the United Kingdom, and Japan already provide such insurance to oil projects outside their borders. Moreover, the benefits of correcting market failure are limited to supply that diversifies current sources, as noted above.

Reducing Economic Vulnerability

The idea that expanded oil production would itself reduce the macroeconomic impact of oil shocks should also be treated cautiously. It would be hard to argue that the U.S. economy is more vulnerable to oil shocks than it was in the 1970s, despite the substantial decline in U.S. oil production and the attendant increase in oil imports. Many countries experienced recessions following the oil shocks of the early 1970s, despite the then-prevailing low oil prices. Why should restoring U.S. oil production to 1970s levels—even if it could be done economically—reduce economic vulnerability?

In principle, expanded oil supplies could diminish economic vulnerability by reducing

Characteristics of Oil Supply

To understand the effects of policies aimed at enhancing oil supply, it is important to bear in mind a few characteristics of oil production:

PRODUCTION TECHNOLOGY *has low variable costs and high fixed costs, implying operation close to capacity, so that downward as well as upward price jumps will only slightly affect supply unless capacity itself changes.*

INCREASING PRODUCTION CAPACITY *(and transportation capacity in many areas) requires substantial up-front investment, implying that sharp price increases will elicit little additional supply capacity in the short run.*

RESERVES ARE GEOGRAPHICALLY CONCENTRATED, *so local problems can have global consequences. Local problems may include: natural disasters that damage production or transportation infrastructure (for example, hurricanes); political risk and domestic instability; regional conflict; and accidents or equipment malfunction.*

PRODUCTION AND TRANSPORTATION CAN HAVE ENVIRONMENTAL CONSEQUENCES, *particularly leakage and spills. In the case of unconventional oil supplies that require mining to extract, issues like water use and land and habitat degradation must be considered.*

the size of the shocks themselves. To do so, however, supplies would have to be able to be increased substantially in response to price spikes or would have to be located in areas of the world that are not shock prone. As discussed in the box on the prior page, these conditions are not easily met.

Expanded output could potentially attenuate shocks in two ways. In a famous quote on the occasion of switching energy supply from domestic coal to imported oil, Winston Churchill said, "Safety and certainty in oil lie in variety and variety alone." Supply disruptions arising from regional conflicts or problems in oil-producing countries will be smaller relative to the world market if world production is more geographically dispersed. In this respect, policies such as opening up the eastern Gulf of Mexico to drilling would, at best, lead to increased supply from an area of the United States already highly prone to hurricane disruption. It would also do little for energy security, especially as 25 percent of all U.S. oil production already comes from there. In contrast, expanding supplies from multiple sources should help; oil reserves are widely distributed in Africa, for example.

In theory, the second way for expanded oil supply to attenuate shocks is by reducing their impact on prices. This would require supply to be price elastic—able to be increased quickly and substantially in response to the higher oil prices accompanying shocks. Unfortunately, just the opposite is the case. Maintaining the spare capacity needed for expanding supply quickly would be far too costly.

Expanding oil supplies through government subsidies should be regarded with healthy skepticism. Increasing oil supply in response to price changes is simply unrealistic in the short run, and any policy-induced increase would take several years to take effect, at best a policy for the long term. The only supply source that can be increased or decreased quickly and substantially in response to oil-price changes is inventory, whether private or public. The case for government intervention is strongest in the case of mitigating oil shocks, but this is a matter of using strategic reserves, not expanding supply capacity. Several countries maintain oil stockpiles, including the United States, in the form of the Strategic Petroleum Reserve.

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Environmental Pros and Cons

Expanding oil production capacity is the subject of considerable environmental controversy, leading to moratoria on oil exploration and development in selected federal offshore waters and—particularly controversial—the prohibition on oil drilling in the Arctic National Wildlife Refuge (ANWR). The environmental impacts of oil production can range from modest to significant, depending on geographic location, the technology used for oil extraction, the means of transport, and—in all cases—availability of labor and technology to mitigate environmental impacts.

The oil-environment tradeoff is especially vexing in the case of ANWR, where the government's best estimate is reserves of around 10 billion barrels. Development of ANWR would likely result in annual production of about a million barrels a day 10 years from now, a level of output representing a 1 percent increase in world supply, with gasoline prices falling by just a few cents per gallon.

Other things being equal, an expanded volume of oil supply inescapably exacerbates the environmental threat, which in recent years has prompted concern over rising carbon dioxide (CO_2) emissions. Of course, other things aren't always equal. So it's important to recognize that, while the public's oil-related attention is normally directed to the negative environmental effects of extraction, transport, refining, and end use, a variety of technological advances have, over the years, enhanced the environmental integrity of oil operations spanning the entire fuel cycle—from wellhead to tailpipe.

Moreover, the petroleum sector offers the potentially beneficial prospect of at least one contribution to managing perhaps the most vexing environmental dilemma of our time—greenhouse gas emissions. That contribution is carbon sequestration—the injection into underground cavities or reservoirs of CO_2 that would otherwise be released into the atmosphere. CO_2 is routinely injected into existing onshore oil wells to increase pressure and oil recovery. More innovatively, a considerable quantity of CO_2 is being sequestered in the seabed in the North Sea Sleipner Field.

As the exploitable resource base shifts to unconventional sources of oil—as is already happening on a significant scale with respect to Alberta's tar sands—the nature of environmental concerns changes. A case in point is water scarcity in an arid region like the U.S. Rockies, where substantial oil-shale reserves are located. There, problems of water scarcity and the challenge of re-vegetating a desert landscape compound the need to deal with the volume of mine wastes that oil-shale extraction poses. Just as worrisome is the relatively high carbon intensity of these synthetic fuels: a gallon of tar-sand-based gasoline has been estimated to produce at least 25 percent more CO_2 than a gallon of fuel derived from conventional crude oil. The prospective conversion of coal to liquids won't make things any easier.

Decisions by oil companies and market arrangements governing trade, investment, and contractual practices will be central to future oil-supply conditions. Though their role is often controversial—witness the unhappy experience of the U.S. Synthetic Fuels Corporation (see the box below)—governments clearly have significant responsibilities in formulating policy initiatives to address the sharp divergence in benefits and costs facing oil companies from the benefits and costs facing society.

In short, eliminating vulnerability to oil shocks through expanded oil supplies is unrealistic. In a world of unpleasant surprises, with major oil resources largely situated in difficult regions of the world, the years ahead are likely to be anything but smooth. ■

The Synthetic Fuels Corporation: A Cautionary Lesson on Picking Winners?

Government has an undeniably important role in supporting the development of alternative fuels and innovative energy systems. At the same time, the inclination—from time to time—to target *specific* resources, technologies, or outcomes can prove risky and ill-advised. A sobering historic example relates to the initiatives of the U.S. Synthetic Fuels Corporation (SFC).

SFC was created as a quasi-independent but public institution under the Energy Security Act of 1980 in response to the energy turmoil of the 1970s. Through a variety of financial incentives, it sought to stimulate production of shale oil and coal-derived fuels.

The bullish atmosphere that accompanied formation of the SFC rested on the prospect of synfuel costs being within a range likely to be approached and perhaps surpassed by world oil prices within a near-term planning horizon. A synfuels capacity for the production of several million barrels per day of crude oil equivalent was seen to have a good chance of materializing in less than a decade, albeit with prospective federal financial support in the billions of dollars.

Alas, it didn't happen. The world oil-price collapse in the mid-1980s and formidable technical hurdles ensured the corporation's demise in 1986.

But it is best not to view all this as a morality tale of the hazards of government taking upon itself an overly entrepreneurial role, best left to the private sector. For the private sector was, in fact, itself a significant actor in the SFC drama. Exxon in 1981 committed nearly $2 billion (in price levels of the period) to its Parachute, Colorado facility. Within a couple of years, the company was estimated to have spent hundreds of millions of (non-federal) dollars in Colorado alone. No shale oil was produced. But hindsight is cheap; even hard-nosed private entrepreneurial strategies can founder when the unpredictability of oil price trends is compounded by untested technological challenges.