

of OPEC's market power remains open to debate. And ANWR output would fractionally reduce energy security by helping to maintain a more oil-dependent economic system.

From a macroeconomic perspective, reducing the petroleum intensity of U.S. economic activity is the key to increasing energy security. There continues to be hot debate on how cost-effective conservation measures might be relative to the benefits. The National Research Council study of vehicle fuel economy included an expert judgment that energy security benefits might be worth between \$0.02 and \$0.24 per gallon of gasoline, with a "best guess" of \$0.12 per gallon. (My own view of the magnitude of these social values is more conservative.) Embedding these values in petroleum prices by, for example, a gasoline tax would only fractionally increase energy efficiency, though the increase no doubt would be greater in the longer term as vehicle purchases adjusted. And even if optimists are right about the low cost of regulated increases in fuel economy, these increases would come nowhere near to eliminating exposure to macroeconomic adjustment costs.

While conservation and energy efficiency improvements have an important role in enhancing energy security, a more robust policy program would also include a number of other elements over the shorter and longer terms. In the shorter term, the United States must figure out how to more effectively use its roughly 550 million barrel Strategic Petroleum Reserve (SPR). The Bush energy plan restates the old and misguided view that the Reserve should only be used for

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some undefined "emergency," not as a way of altering market prices. But if the energy security problem is fundamentally related to jumps in energy prices, should not moderating those prices be a central policy goal?

In the past, some analysts have called for treating the Reserve as a publicly provided source of supplemental supply that the private sector can bid for through the same kinds of options contracts that are already found in commodity exchanges. This kind of approach needs to be dusted off and seriously considered, together with a small excise tax on all petroleum consumption that would pay for the operating costs of the Reserve. Otherwise the Reserve should be emptied and the funds from its sale should be devoted to more worthwhile purposes. In concert with a plan for effective use of the SPR, policymakers need to address ways to lower institutional and regulatory obstacles to expanded energy system flexibility (for

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capacity where bottlenecks exist), and the need to provide effective and fair income protection for low-income households disproportionately harmed by energy price spikes.

Over the longer term, affordable energy security will come mainly from increasing both the diversity of energy sources and the responsiveness of energy consumption to price changes. In the transportation area, for example, one could pursue policies to expand the use of vehicles that use both gasoline and other fuels. However, a more effective option in the long-term may well be increased use of highly efficient and (eventually) non-fossil based energy systems like hydrogen fuel cells. Unfortunately, most of the highly desirable new energy systems probably are still some years (or even decades) away from large-scale commercial adoption. That may not be too long to wait if one views the energy security problem as manageable in the short term through the SPR and unavoidable diplomatic/military efforts to protect oil supplies.

If one wants to accelerate the pace of energy diversification, then what is needed are more public expenditure on a much more concerted effort to overcome technical hurdles and a change in the current economic condition of energy markets wherein low fossil fuel prices make advanced technology development and diffusion unprofitable. We can get as much energy security as we are willing to pay for through a combination of higher current energy prices and increased R&D efforts. But we cannot get something for nothing, at the end of a drill bit or otherwise.

uncertainty, we can articulate three important general points that are very muddled in current energy security debates. First, the macroeconomic vulnerability of the U.S. economy to oil price shocks depends on the intensity of our petroleum consumption, and consumption throughout the industrialized world, not on total U.S. imports or imports from the Middle East. Even if we could magically and costlessly raise domestic output tomorrow to eliminate our imports, a shock in world oil markets would still affect domestic prices and threaten macroeconomic distress. This is because U.S. petroleum suppliers would charge the same price as other suppliers charge internationally. The same is true if we could somehow magically reduce our imports of more "insecure" oil and rely (as we now already do) primarily on "safer" import sources: a shock anywhere in the world will be felt throughout the integrated world oil market.

Second, the economic cost of eliminating oil imports either by increasing domestic energy supplies or increasing the efficiency of energy consumption would be enormous. To illustrate, a July 2001 report from the National Research Council highlights how experts continue to debate what increase in vehicle fuel efficiency could be achieved at a modest cost. But even the strongest advocates of plucking the "low-hanging fruit" in this area are advocating efficiency gains that would still leave the U.S. dependent on foreign oil. No expert has made a credible claim that we could enhance North American oil output or improve energy efficiency sufficiently to drastically reduce or eliminate imports, at least in the short to medium term.

Third, it is misleading to view the costly U.S. presence in the Middle East

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as just a product of the high degree of oil dependence in the U.S. economy and to argue that import reductions could significantly reduce the costs of Middle East involvement. This is because the cost of substantially reducing U.S. oil imports would be quite high and, even if we did so, the rest of the industrialized world would still be highly dependent on uncertain oil supplies from the Middle East. Moreover, the U.S. presence in the Middle East serves other ends beyond oil security.

Policy Implications

Scoffing at arguments in favor of improved energy conservation, Vice President Cheney and others in the Bush administration have made the case for increased domestic energy production to enhance energy security. Following the release of the administration's plan, legislation was introduced in the House of Representatives (HR4) that would seek to stimulate energy supply with new tax breaks for domestic energy, including petroleum, as well as by opening ANWR to petroleum exploration and production. Critics of the administration plan have been equally adamant in arguing against ANWR drilling and in favor of policies to induce greater energy efficiency (in particular vehicle efficiency), as well as expenditures to develop and promote long-term use of domestic renewables.

To sort through this welter of

conflicting proposals, it is useful to return to the logic of the international oil security problem developed in the previous section. One strong implication of that discussion is that increases in U.S. domestic petroleum output will do relatively little to enhance energy security. A major increase in U.S. output could increase the competition OPEC faces in the short to medium term, thereby moderating oil prices somewhat. However, U.S. oil production is simply too high-cost, with too limited reserves, for increases in domestic output to do much to restrain whatever market power OPEC might possess, especially over the longer term. Moreover, while increased U.S. output might fractionally reduce the probability and severity of disturbances in the world oil market, it will also increase vulnerability to the extent that it helps keep prices down and discourages longer-term reductions in the oil-intensity of overall economic activity. Again, the problem here is one of total consumption relative to economic activity, not one of import dependence or sources of imports. Finally, the social cost of expanding domestic supplies through development of higher-cost resources and the granting of more indirect subsidies is likely to be considerable.

A corollary of this reasoning is that the energy security argument for drilling in ANWR is at best weak. Opening up ANWR can be debated on economic and environmental grounds (that is, the oil assets in ANWR have a social value if exploited, but so does the preservation of undeveloped environmental conditions there). ANWR output could confront OPEC with some increased competition in the medium term. But OPEC already faces and will continue to face competition from increases in other non-OPEC oil supplies, and the strength

reverse Mark Twain's aphorism, reports of OPEC's ascendancy may once again be premature. As previously noted, oil prices have eroded considerably over the past year, and there is now talk of lowering the target price band. While the economic downturn and softening of world oil demand is partly responsible, OPEC's difficulty in coping with these developments is telling. Moreover, just as rising production in the North Sea fields and a resurgent industry in North America during the 1970s stemmed OPEC's ability to maintain higher prices, this time Russia has taken advantage of market conditions to serve its own interests with high oil output. In the next few years, many observers also expect greatly expanded output from other parts of the former Soviet Union located around the Caspian Sea.

In the longer term, OPEC could be in a stronger position to exercise substantial market power. It controls around three-quarters of the world's known oil reserves, and the U.S. Energy Information Administration projects that OPEC's share of world output could rise to 50% by 2020. This state of affairs is unlikely to be reversed even with technical progress in oil recovery and discoveries of new oil reserves elsewhere. From the U.S. perspective, while amazing technological advances have helped stabilize domestic output and such advances should continue in the future, the United States will inevitably become more dependent on imports in the longer term. However, the prospect of stronger OPEC market dominance in the longer term calls for a different policy focus than today's renewed calls for "energy independence."

No matter who produces the oil, a shock to global supplies

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(accidental or deliberate) will cause oil prices to rise abruptly. The reason is that in the short term, the demand for petroleum products is not very responsive to price increases, so a significant price increase is needed to clear the market with reduced supplies. This is especially the case for transportation fuels, which is the dominant use of petroleum products (about two-thirds in the United States). While price shocks are uncomfortable in practice, they are not likely to be that large or long in duration (though there is a chance they could be quite severe if, for example, Saudi Arabia's entire output was lost for five years). Moreover, fairly large swings in petroleum prices seem to have become business as usual in what is apparently an inherently volatile market. In light of these points, how serious are the macroeconomic threats posed by oil price volatility?

Macroeconomists and other analysts have extensively studied this question,

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notably the effects of monetary policy (if monetary authorities fear inflation from oil price increases they could reduce the money supply, exacerbating or even becoming the primary cause of an economic contraction). Almost all studies do indicate a significant empirical link between oil price jumps and slumps in macroeconomic performance. This link is a legitimate concern for public policy. While individual oil buyers and sellers will have incentives to hedge their own financial risks (buying more fuel-efficient equipment, holding inventories, or hedging on the futures markets), they will not take into account the economywide stakes in the oil-intensity or broader energy-intensity of economic activity.

However, the existence of an empirical link between oil prices and the macroeconomy still leaves important questions hanging. We still lack a solid understanding of how households and businesses respond in the face of energy market disturbances, including decisions to build up or use petroleum inventories that can substantially affect the market. For example, if past experience and expectations gleaned from futures markets suggest that an energy price shock likely will be short-lived, why would it necessarily be so disruptive? Moreover, the continued slow decline in the oil and energy intensity of the economy may help explain why the link between energy prices and the economy seems to be getting somewhat weaker over time. Finally, while research has established that ill-timed monetary policy can exacerbate an energy market shock, it has not yet established what energy policy measures are best suited to deal with the issue.

Notwithstanding the empirical

security problem, focusing for reasons of space on traditional concerns related to oil markets and economic vulnerability to oil price shocks. I then trace out the implications of these security issues for energy policy. The fact that energy markets may have unwelcome features like price volatility does not automatically imply the need for a policy response. To justify a policy intervention, it is necessary to identify a condition that a government policy might improve upon, so that the cure is better than the disease. My assessment of the energy security problem leads me to reject several popular nostrums and to more circumspectly advocate others.

The Different Components of Energy Security

We can highlight two basic elements of the international oil security problem.

Exercise of market power by international oil exporters to raise petroleum prices has been a longstanding concern. For much of the 20th century, the United States maintained a tariff on oil imports to protect its petroleum industry against lower-priced competition from abroad. By the early 1970s, concern had shifted to the ability of OPEC to exercise its muscle to restrict supplies and raise prices. While beneficial to U.S. domestic oil producers, such activity would be detrimental to the economy as a whole because it would raise the real cost of domestic and imported oil for U.S. businesses and households, thereby diminishing the opportunities for consumption and saving we would otherwise enjoy.

Macroeconomic disruptions from oil or other energy price instability became a concern in the 1970s in the wake of the economic downturns and inflation that industrialized countries suffered

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after the oil price shocks of that period. Such shocks could result from a variety of causes including unexpected supply reductions by individual oil suppliers or suppliers as a group, unexpected surges in demand (due for example to a cold winter), or destabilizing inventory adjustments (build-up of stocks when the market already is tight).

Unexpected and rapid jumps in prices appear to have macroeconomic consequences that went beyond the direct impacts of an increase in energy costs. Researchers have offered a variety of explanations for this multiplier effect. Energy price shocks could increase unemployment because worker productivity drops when energy use is curtailed in the face of rising prices and real wages do not drop to reflect this productivity decline. Fixed capital could be idled or made prematurely obsolescent if there is a sharp and sustained increase in energy prices. The economy as a whole could experience adjustment costs as producers and consumers attempt to respond to the change in relative energy costs by altering the bundles of goods and services they make and buy. In addition, the direct and indirect burdens of higher energy prices are likely to be disproportionately borne by lower income groups.

Other energy security concerns include localized energy supply reliability and price volatility, threats to energy infrastructure, and links between

environmental security and energy policy. Again, for reasons of space, my focus here is on issues linked to international oil markets. A central feature of both concerns identified above is their manifestation through energy prices. The issues are not about "running out" (the world has hundreds of years of existing and potential reserves), targeted embargoes, or how much oil the United States buys from particular countries (the last two being meaningless in an integrated world oil market).

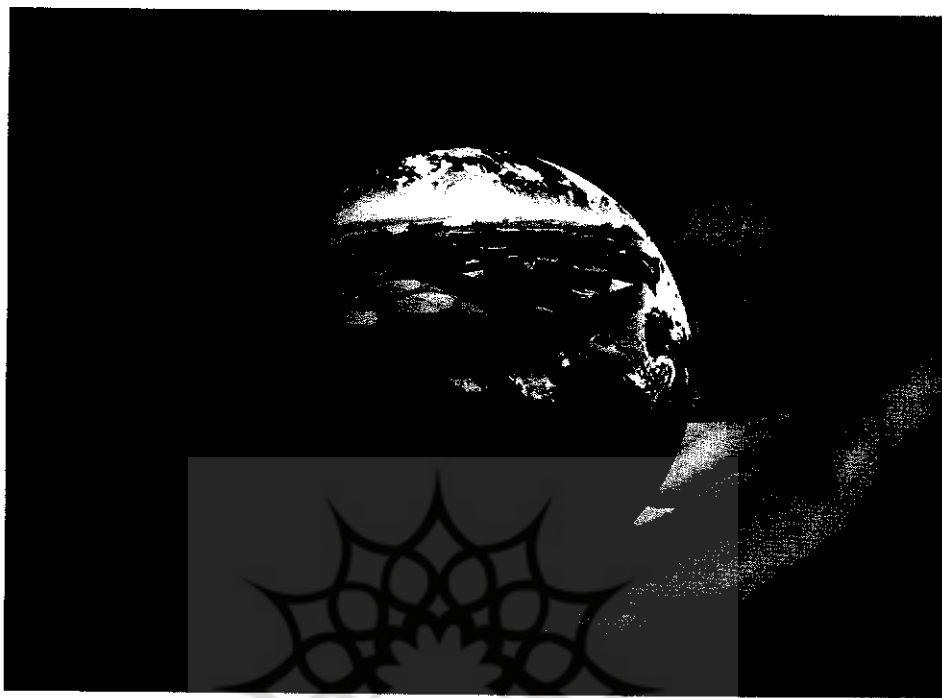
How Serious Are Oil Security Problems?

Can we identify market failures related to energy security and put a price tag on the resulting social costs? Issues related to oil security have been studied intensively for over 20 years, but experts still disagree on the magnitude of the problems.

Beginning in the late 1990s, a number of political and economic analysts pointed to what appeared to be a confident and resurgent OPEC ready to assume control of the world oil market. Several factors were highlighted: a more cooperative leadership in Venezuela and (more recently) in non-OPEC Mexico, less contention between Saudi Arabia and Iran, and the formal adoption of a target price band (\$22-28 per barrel) that made oil production targeting by OPEC seemingly more technocratic and less political.

Adam Smith would never recognize in the current world oil market a textbook example of perfect competition. In principle, OPEC should be able to exercise considerable market power given its large share of international production (around 40%, with a somewhat higher share of world production capacity). However, to

International Oil Security: Problems and Policies



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Introduction

The upwelling of concern about energy security in the wake of the September 2001 terrorist attacks only amplified a trend that was already visible in U.S. energy policy debates. World oil prices rose from about \$10/barrel in 1998 to over \$30/barrel in late 2000, though they have since eroded to below \$20/barrel. In 2000, the United States imported almost 60% of its total petroleum consumption, though imports from the Organization of Petroleum Exporting Countries (OPEC) were only about one-quarter of consumption (45% of total U.S. imports).

Energy security was a central theme in the Bush administration's energy

policy report released by Vice President Cheney in the spring of 2001. Since the release of the administration's energy policy plan, the terrorist attacks, and heightened international tensions in the Middle East and elsewhere during the fall of 2001, rarely has a week gone by without a statement in the press by some pundit for increased energy security - and even "energy independence" or freedom from imported oil.

All kinds of policy goals have been advanced in the name of oil security. They range from drastic increases in motor vehicle fuel economy to increased funding for wind energy to drilling in the Alaskan National Wildlife Refuge (ANWR) to political jawboning of

Mexico to increase supplies and eschew cooperation with OPEC. Some of the proposals wrapped in the mantle of oil security - in particular the notion of eliminating oil imports - have been plain silly.

More broadly, debate over energy security options has been hindered by a lack of clear understanding concerning the different components of the energy security problem and their often-contrasting policy implications. (For those of us who lived through similar debates in the late 1970s and early 1980s, there is an alarming sense of déjà vu in all this; the half-life of energy policy analysis apparently is fairly short.)

In this article, I start by identifying the different components of the energy

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