Cato Handbook for Policymakers

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43. Energy Policy

Congress should

- open up public lands currently off limits to the oil and gas industry in the outer continental shelf and the Arctic National Wildlife Refuge for exploration and drilling;
- repeal Corporate Average Fuel Efficiency standards along with all other energy conservation mandates;
- repeal subsidies for all energy industries, including oil, gas, coal, nuclear, and renewable energies of all kinds;
- repeal fuel consumption mandates for ethanol and resist prospective consumption mandates for other renewable energies;
- eliminate all targeted public energy research and development programs and replace them with a generalized tax credit for private research and development undertakings;
- transfer the maintenance of the nuclear weapons stockpile from the Department of Energy to the Department of Defense and privatize the national laboratories;
- sell the oil from the Strategic Petroleum Reserve and terminate the program;
- eliminate the Department of Energy and all its programs; and
- refuse appeals to impose new taxes and/or regulations on energy producers and manufacturers.

Polling data during the 2008 campaign season found that soaring gasoline prices were, aside from the financial crisis, the most important single issue on the minds of voters. Naturally, politicians have responded with a flurry of legislative proposals designed to reduce fuel prices at the pump. Unfortunately, there is little political agreement on why gasoline prices are at near-historic heights, and this disagreement sets the stage for the arguments about energy policy that now dominate the political landscape.

Understanding of the Price Spiral

The conventional narrative is that changes in gasoline prices can be almost entirely explained over the long run by changes in world crude oil prices. World crude oil prices have increased for six consecutive years—the longest sustained oil price increase in history—because of spectacular global economic growth over that same period. The global economic boom of 2003–08 has increased the demand for all commodities—including crude oil—and this demand shock hit the market at a time when both excess oil production capacity and private oil inventories were at very low levels. Given the fact that neither the demand for nor the supply of crude oil changes very much in the short term in response to price changes, even a modest increase in demand can have a major effect on oil, and thus gasoline, prices. Some economists who study these matters have concluded that the 300 percent increase in global oil prices since 2003 could be entirely explained by a 6 percent increase in global oil demand.

There is room to quibble about the exact mathematical relationship between demand increases and oil price hikes (some data sets, for instance, suggest that a 21 percent increase in global oil demand would be necessary to deliver a 300 percent increase in global oil prices), and, likewise, room to argue about just how one might measure demand (all we can reliably measure is consumption). However, the claim that increased demand for crude oil explains *most* of the price increase since the beginning of the price spiral is widely embraced by most oil economists and oil market analysts.

The conventional narrative holds that whatever *cannot* be explained by the aggregate demand shock can be explained primarily by two additional developments.

First, several modest oil supply disruptions have hit the market over the past few years. When taken as a whole, those disruptions have significantly affected the global oil supply. Civil war in Nigeria, for instance, has taken at various times over the past several years over 1 million barrels of crude oil production a day out of the market. Hurricanes in the Gulf of Mexico have likewise removed over 1 million barrels a day from the market for months at a time. The war in Iraq has reduced oil production and deterred investment in upstream production capacity. Although such events are nothing new to oil markets, an unusually large number of supply disruptions have hit the market in recent years, taking oil out of a market already characterized by growing scarcity and thus exacerbating the price spiral.

Second, global oil production actually *fell* in 2002, 2006, and 2007. While the supply disruptions noted earlier played some role here, declining

production from existing reserves (due to both field exhaustion—primarily in the North Sea—and the economic mismanagement of nationally owned oil companies like Mexico's PEMEX) has been the primary driver.

The conventional narrative is informed by a wealth of empirical work and solid data and is almost certainly correct. Hence, ''bad'' public policy did not cause the increase in retail gasoline prices. The clear implication is that ''good'' public policy will likewise prove an ineffective remedy.

While the conventional narrative is widely embraced by economists and market analysts, it appears to be a minority perspective within the political class. Both liberals and conservatives offer rather different explanations for the gasoline price spiral. Although both make some allowances for growth in aggregate global oil demand, both liberals and conservatives argue that other factors play a far larger role in the present price spiral than the increase in global economic growth.

Speculators in the Dock

One of the alternative narratives popular among politicians today is that the flow of money into oil futures markets is substantially increasing the demand for crude oil and thus the price of crude oil. Conservatives fond of this claim contend that the market is caught up in an oil price bubble. Liberals argue that speculators and institutional investors are to blame.

Many of those making this argument, however, conflate the purchase of oil delivery contracts with the purchase of oil. The two are not the same. Only about 2 percent of the contracts in futures markets are ever settled in oil. Most of those buying commitments for oil delivery in these ''futures'' markets in turn sell those commitments to oil refineries or other parties in spot markets when the contract approaches its delivery date. (Spot markets earn their name, by the way, because oil is delivered, figuratively speaking, ''on the spot.'') If the spot price is higher than the contract price, profits are made; if not, losses are incurred.

Accordingly, the best way to think about futures markets is that they allow people to bet on the price of oil in the future, and most of the bets are about the price of oil for delivery at the end of the following month. For every bet that prices will exceed x, another bet must be made that prices will fall below x because it takes two parties to enter into a contract.

The question, then, is how do bets on the *future* price of oil affect the actual price of oil—present or future? The answer must have something

to do with the effect those bets have on either the supply of oil or the demand for oil. Nothing else will do.

Those bets might affect real (spot) prices in two ways. First, if the futures price is higher than the spot price, market actors might buy oil in spot markets, put it in storage, and sell it forward into futures markets, thereby locking in a risk-free profit. Removing oil from spot markets and locking it away in inventories reduces the supply of crude oil available to refiners and increases oil—and thus gasoline—prices. Second, if oil producers notice that the futures price is higher than the spot price, they might reduce production today to increase production tomorrow when prices and thus profits will be higher. Less oil production in the short term equals higher present prices but, of course, lower prices than might otherwise have been the case in the future.

Hence, if the flow of cash into the oil futures market is affecting spot prices, we would expect to see some evidence of oil inventory buildup or strategic production declines. Yet oil inventories have been declining over the course of the oil price spiral, and there is no correlation between futures prices and global oil production trends.

We would also expect to see some evidence that changes of behavior in the futures market preceded higher prices in spot markets. But a rigorous statistical test of that proposition by the Interagency Task Force on Commodity Markets (a task force organized by the Commodity Futures Trading Commission) finds no evidence for that proposition. Between January 2003 and June 2008, the task force found that ''there is little evidence that daily position changes by any of the trader sub-categories systematically precede price changes.''

''Big Oil'' and Price Gouging

Another explanation popular with the political class is that major vertically integrated private oil companies are simply gouging the public with high prices. Evidence of record-high profits by ''Big Oil'' is marshaled for that proposition.

Yet high profits do not necessarily provide evidence of market power. For instance, if severe weather destroys the Florida citrus crop, citrus growers in California will make above-average profits because the lost supply will drive up price; if it did not, shortages would occur because preweather demand would stay the same but postweather supply could not possibly meet that demand. In this case, evidence that California citrus profits have risen would not constitute evidence that California citrus

growers ''caused'' the high prices. The analogy to the oil sector would hold except for the fact that shortages are the result of economic growth rather than weather.

Nevertheless, profits in the oil and gas sector are greatly overstated. In 2007, oil and gas company profit margins averaged 8.3 percent (defined as net income divided by sales). By comparison, profits in the manufacturing sector as a whole (minus the auto industry) were 8.9 percent in 2007. A better metric of profitability is return on equity. While it's true that industry returns have been 5 to 15 percent better than those available to the manufacturing sector as a whole during the course of this price spiral, that's not particularly striking, because returns on equity were lower than those available to manufacturers during the preceding 20-year period.

The charge that investor-owned oil companies are ''causing'' oil price increases presupposes that the companies in question are actually capable of increasing global crude oil prices. Although most people seem to believe that Big Oil controls the oil market—or at the very least, has enough power in those markets to manipulate prices—the data tell a different story. ExxonMobil, British Petroleum, Shell, Chevron, and ConocoPhillips combined account for only 15 percent of the oil production coming from the top 100 oil companies in 2007. The largest—ExxonMobil—has only a 3.8 percent share of that market. Moreover, Big Oil controls only 3.9 percent of the global oil reserves held by the world's top 100 oil companies. Hence, arguing that Big Oil controls oil prices is akin to arguing that some collection of small, regional fast-food retailers like Jack in the Box or Hardee's controls fast-food prices nationwide.

The accusation that Big Oil has market power further downstream in the oil business—that is, in the national refining and retail marketing sectors—is on equally shaky ground. Big Oil is losing—not gaining—downstream market share, and the standard metrics employed by economists to measure market power find very little of it in refining markets or wholesale and retail fuel sales.

The Decline of the Dollar

Many have claimed that the decline of the dollar explains much if not most of the oil price spiral. The argument is that the global oil trade is conducted in dollars, so the less valuable the dollar, the less oil the dollar can buy. Moreover, when consumers in other countries buy oil, they must first use their currency (say, euros) to buy dollars. The more valuable those other currencies are relative to the dollar, the more dollars—and

thus the more oil—can be bought. Hence, price increases will be felt more lightly by those with stronger currencies than by those with weaker currencies. Accordingly, demand response from consumers trading in relatively ''strong'' currencies will be less robust than from those trading in weaker currencies.

That claim is largely correct but misleading. From January 2003 to May 2008, the dollar fell, at most, by about 25 percent relative to ''all other'' currencies, and 75 percent of oil demand is denominated in those other currencies. That implies that world oil demand is 19 percent higher than it otherwise would have been absent the decline of the dollar. Although that might be enough of a change in global demand to explain a large fraction of the oil price increase that occurred over the same period, changes in currency valuation do not ''cause'' changes elsewhere in the economy. Instead, changes in the economy ''cause'' changes in currency valuation. For instance, it may well be that changes in oil prices cause changes in currency values! That's because the demand for dollars (and thus the value of dollars) are a reflection of the desire to engage in the trade of goods and services governed by dollars. In short, exchange rates reflect market realities; they do not *change* them.

Is OPEC to Blame?

Many have suggested that production restraint by members of the Organization of the Petroleum Exporting Countries explains the recent oil price increases. Yet there is very little correlation between OPEC production decisions and crude oil price movements over the past several years and little evidence that any significant amount of withholding on the part of OPEC member states is occurring in the market.

A stronger argument is that there would be more oil production and perhaps more excess production capacity were it not for the OPEC cartel. That may well be, but OPEC's production restraint didn't begin in 2003. OPEC has not invested significant funds in oil exploration and development for more than three decades. Hence, no change in OPEC's behavior explains the oil price surge that began in 2003.

Regardless, it is unclear whether there is less oil production with an OPEC cartel than there would be in a hypothetical world without an OPEC cartel. Numerous economists who have attempted to isolate the effect of OPEC on oil production, and thus oil prices, have found no hard evidence that the cartel succeeds in its mission.

The reason for this lack of evidence is partly because of the difficulty in determining whether profit-maximizing private firms would produce more or less oil than is produced by the national oil companies controlled by OPEC. For instance, if one believes that production restraint is a profit-maximizing strategy for Saudi Aramco, then a privately owned Saudi Aramco would likely restrain production as well absent an enforceable government directive to forgo profits and produce at some level dictated by the state (a policy, by the way, that would rob oil from future generations to benefit the present).

While cooperation among privately owned oil companies in the course of establishing production schedules would be illegal in most Western countries, the cartel is a rather ineffective vehicle for producer cooperation. Each member faces strong economic incentives to cheat on production quotas; thus, cheating is the rule rather than the exception, particularly when oil prices are high. Research suggests that cartel members do curtail production at some times to some degree in response to quota allocations, but how often and to what extent is unclear.

Peak Oil

A growing number of market analysts, industry investors, and policy advocates are convinced that conventional crude oil is becoming more scarce, and thus more expensive, as the world consumes ever-larger quantities of something for which there is only a fixed supply. A cottage industry has thus arisen around the proposition that global oil production will soon peak and then begin a slow but rapidly accelerating decline. This approach of ''peak oil,'' according to some, explains the growing scarcity—and thus the rising price—of low-cost crude oil.

Although there is mathematical certainty about the fact that at some point conventional crude oil production will peak, there is little reason to think that day is necessarily on the economic horizon given production data over the past several decades. If oil were growing scarcer, for instance, we should see some evidence of that in rising crude oil prices. But a rigorous analysis of crude oil prices from the first quarter of 1970 through the first quarter of 2008 by economist James Hamilton finds no statistically significant scarcity signal at all. On the contrary, his analysis finds that ''the real price of oil seems to follow a random walk without drift.'' Hence, we cannot say for certain what most people seem to believe—that oil prices have been increasing over time.

Furthermore, Hamilton's analysis suggests that the best predictor of future price (that is, future scarcity) is present price, but the variance is large: 15.28 percent per quarter. That's because small changes in the supply or demand for crude oil have major price impacts in the short run, and any number of minor global events affect the supply or demand for crude oil. Table 43.1, for instance, demonstrates how a forecast for future oil prices made in the first quarter of 2008 grows over time given the observed instability of oil prices.

A conclusion that one can draw from the table is that even if prices rose dramatically in the near future, one could not say with confidence whether that price rise reflected underlying physical scarcities caused by long-term oil field depletions or any number of other short-term supply or demand phenomena commonly seen in the oil industry.

Although peak oilers are correct that new oil discoveries over the last several decades have been smaller and less frequent than in the past, how much crude oil is yet to be discovered is by definition unknown and unknowable. Hence, predictions about ''peak oil'' in the near term may be correct—or not. We simply don't know enough to say.

There are, however, four reasons for optimism. Together, they suggest that expansion of supply is just as likely—if not likelier—than contraction in the near to mid-term future.

First, high oil prices induce more exploration and more risk taking by oil companies. Economist Klaus Mohn observes: ''When the oil price increases, oil companies take on more exploration risk. Consequently,

Table 43.1
95 percent Lower and Upper Bounds on Forecasts for Real Oil Prices

Date	Forecast	Lower	Upper
2008:Q1	$115		
2008:Q2	$115	$85	$156
2008:Q3	$115	$75	$177
2008:Q4	$115	$68	$195
2009:Q1	$115	$62	$212
2010:Q1	$115	$48	$273
2011:Q1	$115	$40	$332
2012:Q1	$115	$34	$391

SOURCE: James D. Hamilton, ''Understanding Crude Oil Prices,'' University of California Energy Institute, 2008.

NOTE: Q = quarter.

discovery rates will fall whereas the average discovery size will increase.'' His examination of exploration and development data off the Norwegian coast suggests that for every 10 percent increase in oil prices, reserves increase by 8.9 percent in the long run.

Second, high prices may likewise induce more production from OPEC countries as well. Claims about depleting reserves may be correct, but there may be many more fields to come.

The Persian Gulf is one of the least explored areas of the world as far as oil and natural gas are concerned. Only about 2,000 exploratory wells have been drilled in the entire Persian Gulf since its emergence as an oil-producing region. The United States, by comparison, has seen more than 1 million such wells. Even today, more than 70 percent of oil exploration activity is concentrated in North America (which holds less than 3 percent of the world's oil reserves), whereas only 3 percent of that activity is occurring in the Middle East (which holds about 70 percent of the world's oil reserves). Moreover, given that most of the exploration in the Persian Gulf occurred decades ago before nationalization of the oil industry, the dramatic advances in exploration technology and know-how have not for the most part been applied to the most promising geological formations in the world. More than a few industry observers argue that, yes, we will almost certainly discover a new Saudi Arabia sometime in the future—but it will likely be in Saudi Arabia.

Will high prices induce substantial new investments in oil exploration in the OPEC countries and Russia, which likewise sits atop very promising but scarcely explored geological formations? Only time will tell, but it is hard to imagine that profit-maximizing oil states would forgo economically promising investments indefinitely, particularly when the oil and gas industry is the primary source of state revenue and prices are on the rise. If new oil is not forthcoming, it will likely be due to political—not geological—constraints.

The upshot is that the observation that major new oil discoveries have declined over the past several decades in both OPEC and non-OPEC countries is problematic because oil prices have likewise been falling over most of that period. Trends in discoveries may historically have more to do with price and politics than with geological scarcity.

Third, major new oil field discoveries are not necessary for major increases in supply. Increasing average field recovery rates from 35 percent to 40 percent, for instance, would increase supply by 300 billion to 600 billion barrels, which is akin to adding a new Saudi Arabia or two to the

market. Given that field recovery rates have steadily improved over time—they averaged only 22 percent as recently as 1980—there is reason to hope that high prices will induce new investment in—and corresponding improvement in—low-cost extraction practices and technology.

Unconventional sources of crude oil are another source of potential new supply. The International Energy Agency believes that 6 trillion barrels of crude oil reside in heavy oil and bitumen stocks (primarily tar sands like those in Alberta, heavy oil deposits like those in Venezuela, and oil shale in mineral deposits such as those found in the Rocky Mountain West), of which 2 trillion may be ultimately recoverable. Given that conventional oil reserves worldwide total 1.3 trillion barrels, this suggests that, should conventional crude oil prices rise high enough because of depletion—or alternatively, should extraction costs of unconventional crude oil decline substantially because of technological advance—massive new sources of unconventional oil supply could enter the market.

Beyond unconventional crude oil are even larger possibilities for synthetic oil production from gas-to-liquid technologies, coal-to-liquid technologies, agricultural oils, and methane hydrates found on the seabed and in permafrost Arctic regions. Hydrocarbons for oil production can be harnessed from many sources, and conventional crude oil fields are but one source of many.

Fourth, investments in new field production have followed the oil price spiral and new supply will soon be entering the market. A recent tally in the *Oil & Gas Journal* of publicly known oil development projects under way found that 28 million barrels a day of new supply is coming from 47 countries over the next two decades, a sum that represents approximately one-third of existing daily global production. Although production declines from existing fields will certainly offset that new supply to some degree, the encouraging fact remains that new supplies at the margin are still potentially quite robust.

Policy Responses

Most voters believe that government must do something to reduce gasoline prices. Because gasoline prices over the long run are a manifestation of global crude oil supply and demand, only by increasing the former or reducing the latter can government policy have the desired effect. Unfortunately, there is little scope for government policy to succeed on either front.

Conservatives argue that opening up public lands currently off-limits to the oil industry—primarily the outer continental shelf and the Arctic National Wildlife Refuge—would provide significant price relief for U.S. motorists. This is possible, but unlikely. The U.S. Minerals Management Service (an agency of the U.S. Department of the Interior) estimates that offshore fields that have not yet been exploited will likely yield about 200,000 barrels of crude oil a day once producing at peak capacity and that development of ANWR could add another 780,000 barrels of new crude oil a day. If so, that would mean that government policy could add about 1 million barrels a day to a crude oil market whose size will likely be about 88 million barrels a day in 2020. That implies a reduction in world crude oil prices of no more than 1 percent. Although one can make a strong case that opening up those fields to the oil industry makes good economic sense—economist Robert Hahn, for instance, estimates net benefits of $668 billion for drilling in ANWR and $1.07 trillion for drilling in previously unexploited offshore areas—one cannot argue that what we currently suspect about those fields suggests that a policy of ''drill, baby, drill'' will reduce gasoline prices in any noticeable way at the pump.

Many, of course, argue that increasing oil supply is either futile or counterproductive. Better, we are told, are policies to increase the supply (and thus to reduce the price) of gasoline alternatives. Accordingly, a blizzard of proposals have been floated to both subsidize and compel the production of plug-in hybrid gasoline-electric-powered vehicles; vehicles propelled by hydrogen-powered fuel cells; and engines that can run on compressed natural gas, corn ethanol, cellulosic ethanol, methanol, and other exotic fuels.

There are three problems with those sorts of policies. First, they presuppose that oil prices will remain high in the future. If oil prices return to prespiral norms (that is, to something less than $30 per barrel), public investment in gasoline alternatives will prove a total economic waste. As noted earlier, those who dismiss the possibility of a price collapse should acquaint themselves with James Hamilton's work. Second, there is no way of knowing which of the many transportation fuel alternatives will prove most economic in the future. Government subsidies and consumption mandates may well go to the ''wrong'' fuels, particularly because government choices are driven as much—if not more—by political considerations as they are by economic considerations, which means that the emergence of the ''best'' fuels could well be slowed or even prevented. Third, they

are unnecessary. Given the high price of gasoline, tremendous profits are available to those who can commercialize vehicles run by something other than gasoline. If an alternative transportation fuel or technology is promising, then no subsidy is necessary; investors will put their own money on line not out of any sense of public duty but out of a love for profit. Subsidies in this case would allow investors to substitute public resources for their own resources and represent a wealth transfer without any good economic rationale.

Public policy to reduce the demand for crude oil is even less compelling. First, even the most aggressive policies that have been suggested would not change crude oil prices very much. For instance, consider the consequences of a 40 percent improvement in the fuel efficiency of the U.S. auto fleet—an improvement mandated recently by Congress via a tightening of the Corporate Average Fuel Efficiency standard. In two decades, that would reduce U.S. oil consumption by 3.6 million barrels a day. If world crude oil production were at 100 million barrels a day by that time (a reasonable estimate), crude oil prices would likely decline by about 7 percent as a consequence of the policy. Hence, if crude oil prices would otherwise have averaged $100 a barrel at that time, they would instead average $93 a barrel. Motorists would scarcely notice the improvement.

Second, from both a social and an individual perspective, too much conservation can be as bad as too little; an observation easily grasped if we imagine a policy to limit highway speeds to 35 miles per hour nationwide, a prohibition against driving passenger vehicles on certain days of the week, a prohibition against all cars larger than a golf cart, or the like. The ''right'' tradeoff between fuel consumption and the services rendered by fuel consumption can be made only on a case-by-case basis by motorists themselves. No third party can hope to know enough about the individual tradeoffs in question to make utility-maximizing decisions for millions of people they have not even met.

Accordingly, a necessary (but insufficient) precondition for government policy to reduce oil consumption is evidence that oil consumers are for some reason resisting conservation that would otherwise be in their best interest. That proposition has been tested by Clemson economist Molly Espey and found wanting. In a recent study, she analyzed model year 2001 new car sales to determine if consumers accurately value the savings of improved fuel economy. In theory, new vehicle buyers should be willing to pay for improvements in fuel economy to reflect anticipated savings given the buyers' expectation of future fuel prices and vehicle miles driven. In practice, they do.

Finally, oft overlooked is that other aspects of federal policy—if executed as advertised—would serve to increase rather than decrease fuel prices. For instance, support for ''energy independence'' is nearly as strong as support for government to ''do something'' about high gasoline prices. Yet policies to discourage oil imports will by definition raise gasoline prices by preventing relatively lower-cost fuel from entering the U.S. market. If oil imports weren't cheaper than the alternative, after all, then the oil wouldn't be imported in the first place. Similarly, policies to reduce greenhouse gas emissions will necessarily increase oil prices if they are to be effective. That's because the only way to reduce those emissions is to reduce the consumption of carbon-based fuels, and the only way to do that is to increase the price of carbon-based fuels—like gasoline. The relative inelasticity of oil demand along with the relative insensitivity of the atmosphere to modest changes in greenhouse gas emissions implies that a massive increase in oil prices would be necessary to reduce oil consumption enough to make any difference regarding global temperatures.

Broken Markets?

Many have argued that anemic supply-and-demand responses to the oil price spiral are evidence that oil markets are somehow ''broken.'' If high prices (that is, resource scarcity) do not induce significant energy conservation or new oil production, then government must act to do what the market will not. The problem with this argument is that it confuses short-term with long-term market response and misunderstands the reason why supply and demand are so inelastic in the short term.

Sluggish consumer response to high prices reflects the fact that energy conservation often requires expensive capital stock (say, a three-year-old sport-utility vehicle or a house in exurbia far from work and mass transit) to be prematurely sold in favor of new capital investments in more energy-efficient equipment (a Honda Prius or a condo in the city). Consumers do not undertake such decisions lightly, which explains why it often takes several years of high and rising prices to induce robust conservation expenditures and related demand reductions. Once those investments are made, it takes years for them to produce significant energy savings. For example, it takes more than 10 years for the U.S. auto fleet to turn over, so the main way that consumers respond to high prices—buying more fuel-efficient vehicles—will require years to significantly affect demand.

For their part, producers do not willingly invest tens of billions of dollars in excess production capacity that will be used only in case of

some sort of supply shock because it would be wildly unprofitable to do so. Likewise, in the early stages of an oil price spiral, producers are often disinclined to immediately invest billions in new production because it is unclear whether those high prices will be there when the new production capacity comes on line—usually 10 or more years later—or even whether prices will be sufficient to cover the cost of the project in question. When producers do respond to price spirals with new investment, they generally find that bottlenecks exist everywhere in the production supply chain. In 2007, for instance, it was reported that all existing offshore rigs were under contract for the next five years. Finally, the threat of higher taxes that always appears during price spirals deters producers from making potentially profitable investments at the margin.

Happily, both the supply and the demand for crude oil are more elastic over the long run. Past experience suggests that a 10 percent increase in price will eventually lead to a 5 percent reduction in demand. While the data necessary to estimate global supply response over the long run do not appear to exist, the best available study on the matter finds: ''Outside of North America, on balance non-OPEC countries have a rightward (expanding) shifting supply function. . . . Supply conditions in OPEC countries cannot be depicted by the interaction of conventional supply functions with price; other factors intrude.''

Government policy to induce quicker supply or demand response is problematic because the three factors responsible for slow market reaction—uncertainty about future prices, the large capital costs associated with supply-and-demand response, and the lag time between investments in supply and demand and significant changes in the same—cannot be remedied by government. Forcing quicker market response to rising prices threatens to ''jump the gun'' and mandate expenditures that will prove economically counterproductive.

Market Failure versus Government Failure

Economists agree that, as a general matter, allowing producers to determine what sort and how much energy to produce will lead to more efficient outcomes and lower consumer prices than would vesting those decisions with government. Likewise, leaving to consumers the decision about how much and what kind of energy to consume will prove more economically efficient than the alternative. Only if we find a specific failure in the market—defined as a condition in which mutually beneficial trade between private parties is for some reason difficult or impossible to execute—

will there be room for government improvement over market decisions. Accusations of market failure are usually grounded in evidence that prices are inaccurate, that is, that they do not fully reflect the costs of production or the costs or benefits of consumption.

Several energy market failures have been marshaled to justify intervention in oil markets, but they either fail to convince or imply interventions different from those offered. For instance, energy depletion implies nothing about the inaccuracy of price signals. The environmental costs of oil consumption are best ''internalized'' in the price mechanism (if they are not already) by an explicit or implicit tax on pollution, not energy per se because the relationship between energy consumption and pollution varies by technology, location, and equipment maintenance. OPEC nations may (individually or jointly) constrain supply, but there is nothing the U.S. government can do about that and the resulting scarcities are fully reflected in oil prices. Developers of new technologies may not be able to capture all the economic gains associated with the commercialization of those technologies, but the proper remedy (if one is necessary) is to make all research and development more attractive to investors, not to vest the government with the power to direct specific R & D activities.

The alleged national security costs associated with oil consumption—perhaps the main rationale offered for intervention since the attacks on 9/11—are nonexistent. The military ''oil mission'' simply does for oil producers what oil producers can and should do for themselves. Embargoes are ineffective because producers cannot control the destination of the oil they produce once it is released into the market. There is no correlation between oil profits (reflected by prices) and either the number of the acts of or the fatalities from Islamic terrorism. Nor is there a correlation between oil profits secured by anti-American oil producers and ''bad acting'' by them. And even if there were some clear relationship between oil consumption and terrorism and/or bad acting abroad, we've demonstrated that there is little that the U.S. government could constructively do about it. Global oil supply and demand do not dance to Washington's tune, and the costs of addressing those problems via energy policy rather than through some other foreign policy response are almost certainly prohibitive.

Establishing the existence of a market failure is a necessary but insufficient condition for government intervention. One must further demonstrate that the government is capable of remedying the market failure in question and that intervention will produce more benefits than costs. That is no easy

task. Government bureaucrats are hobbled by poor information, political decisionmakers are not experts, and short-term political considerations heavily color government policy. Accordingly, it should not surprise that analysts are very hard-pressed to find any examples when past interventions produced positive economic outcomes. As energy economist Richard Gordon puts it, ''The dominant theme of academic writings is that governments have done more harm than good in energy,'' a view ''almost universally supported by academic energy economists, whatever their political outlook.''

The Macroeconomic Case for Energy Market Intervention

Some have argued that the relationship between oil price shocks and recession is so well established that government's stewardship of the economy requires it to act to reduce the likelihood and severity of the oil price shocks that the market sometimes delivers. Although that argument is rooted in academic work published over several decades, recent scholarship is not very supportive.

The best summary of what we know about the effect of oil price shocks on the economy comes from economist Lutz Kilian. His survey of the academic literature, combined with his statistical analysis of quarterly economic data from 1970 to 2006, turns ''common wisdom'' regarding oil price shocks on its head.

Kilian's analysis demonstrates that oil supply disruptions do not correlate well with oil price increases and that the former have virtually no cumulative effect on real oil prices over time. Oil-specific demand shocks (manifest, for instance, by precautionary inventory building in response to international tensions) have the most pronounced effect on oil prices, but oil prices peak in the first month of those shocks and then begin a slow pattern of decline. An aggregate demand shock (the sort we experienced from 2003 to 2008) has only a modest effect on oil prices at first but is more significant over time.

The effect that price shocks have on gross domestic product is mixed. Oil supply shocks that trigger price spirals reduce GDP by about 2 to 3 percent over the first 7 economic quarters of the shock, but most of that loss disappears after 12 economic quarters. Oil-specific demand shocks slowly reduce GDP by almost 5 percent after 12 economic quarters. Aggregate demand shocks increase GDP over the first 4 quarters but then reduce it after the 4th quarter until GDP is reduced by about 5 percent by the 12th economic quarter.

The macroeconomic effect of all three types of oil price shocks is manifested primarily by decreasing demand for automobiles (particularly fuel-inefficient automobiles) and housing. The economy's greater resilience in response to the 2003 aggregate demand shock relative to the 1973 aggregate demand shock is probably best explained by the smaller role the U.S. auto industry plays in the national economy and the fact that consumers have more fuel-efficient domestic cars to switch to than they did in the 1970s. Moreover, the lack of wage and price controls today means that the economy can more quickly and efficiently adjust to rising fuel prices, which was not the case in the 1970s.

The implications of Kilian's analysis are striking. First, government's obsession with oil supply shocks—whether from war, terrorism, bad weather, civil unrest, or political calculation—is unwarranted given past events. Hence, programs like the Strategic Petroleum Reserve, 700 million barrels of federally controlled oil for use in case of some future supply disruption, are expensive and unnecessary insurance policies. Larger, ahistorical disruptions are always possible, but no federal reserve would be large enough to deal with such events in any case.

Second, the most serious macroeconomic damages that follow from price shocks follow from events such as global economic booms and market response to war worries that the government has little (positive) control over. The best that can be hoped for is that the government does not make matters worse by responding with poor monetary policy, the main cause—according to Kilian—of the aggregate demand shock of the early 1970s.

Third, there is no evidence that preemptive intervention in energy markets has reduced the likelihood of, or damage from, price shocks in the past or will do so in the future. While it is a fact that oil markets are volatile and that volatility can have macroeconomic effects, there is nothing that the government can do to affect the underlying supply-and-demand fundamentals that give rise to oil price volatility. Although one might argue that it is more costly to rely on a fuel (oil) that is usually inexpensive but price volatile and occasionally expensive rather than some other fuel that is usually more expensive but less volatile, market actors would provide that ''other fuel'' if there were public demand for such a tradeoff. Apparently, there is not.

The Economic Wages of Inaction

An increasingly popular argument holds that past public inaction is responsible for the present energy crisis. Had Congress embraced President

Jimmy Carter's energy agenda, we are told, oil demand would be substantially less than it is today and the scarcities that are currently driving oil prices would be far less severe or even nonexistent.

This argument, however, ignores the likelihood that less demand from, say, 1980 through 2003 would likewise have yielded fewer reserve additions over that same period because neither private oil corporations nor nationally owned oil companies would have been inclined to invest billions in upstream production capacity simply to watch it remain idle. Hence, we should not assume that, had Congress embraced Carter's energy agenda and reduced global oil consumption by *x* million barrels a day below where it is at present, excess production capacity in that hypothetical would be *x* million barrels a day greater than where it is today. If both markets were in equilibrium, excess production capacity would remain relatively the same in both scenarios. If we then assume that the 2003 aggregate demand shock hits this ''Carter-world'' scenario, the price impact would be no less than it was in actual practice. In fact, the 2003 aggregate demand shock might actually have done *more* damage in this alternative Carter-world scenario because a unit increase in global demand will have a greater price impact on a smaller oil market than on a larger oil market.

Regardless, how might the existing oil price spiral play out absent government intervention? If past is prologue, high prices will eventually increase supply and reduce demand sufficiently to cause a price collapse and a return to (mean) prespiral oil prices. The relative inelasticity of oil supply and demand in the short run works both ways: even small declines in demand and/or increases in supply can trigger price collapse in the short term. Energy economist Severin Borenstein, for instance, points out that a 7 percent decline in oil demand as consequence of the 1981–83 recession was almost certainly responsible for the resulting oil price collapse in 1985. A similar reduction in demand today—whether from global recession or as a response to high prices—would bring prices down into the $20-per-barrel range if the demand elasticities observed over the past decade continue to govern the market. There is nothing that government can do that would have even a fraction as large an effect on oil prices in the short term.

The record surveyed by Hamilton, however, clearly warns that hard predictions are problematic. Any number of other events could emerge to offset the bust that has always followed the boom. Beyond the usual assortment of transient events that have long affected oil markets are

possible endogenous declines in (low-cost) oil production from field depletion and structural changes in the global economy stemming from economic growth in the lesser-developed countries, particularly China and India. Either development could conceivably keep prices high even in the face of long-term supply-and-demand response to high prices.

Still, some evidence suggests that oil—which has been run out of electricity generation and industrial application markets as a consequence of earlier price shocks—may well be on the verge of losing its dominant position in transportation markets as a consequence of this latest price shock. Energy economist Samuel Van Vactor demonstrates that, if the current cost estimates for plug-in hybrid electric vehicles (PHEVs) are to be believed, those cars make economic sense for consumers as long as oil prices remain above $55 per barrel over the lifetime of those vehicles. Moreover, PHEV prices will almost certainly come down as the technology matures and companies experience the manufacturing cost declines that usually follow from ''learning by doing.'' Technologists Peter Huber and Mark Mills make a strong argument that long-term trends in energy applications will likely push the transportation sector away from liquid fuel and toward electricity and that PHEVs may be the first step in this direction of many yet to come.

The very uncertainty surrounding the future of oil prices and transportation markets suggests nonintervention. Government simply cannot know the future, meaning that promises to hasten the arrival of this or that energy future are more likely to delay than accelerate the arrival of that day. Bets by market actors regarding future energy prices and technologies may prove little better, but the diffuse employment of private capital ensures that the consequences of those ''bad bets'' are borne by private investors. ''Good bets,'' however, will produce benefits for all.

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—Prepared by Jerry Taylor and Peter Van Doren