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The terrorist attack of September 11th raised important questions about what may lie ahead for the world oil market and what it could mean for the U.S. economy. On three occasions in the past—the first two OPEC price shocks in the mid and late 1970's and the Gulf War at the start of the 1990's—trouble in the Middle East led to higher oil prices.
The map of world oil supply has changed noticeably since the mid 1970s, with important new sources of supply coming on stream from the North Sea, Mexico, China, Alaska, and elsewhere. Most recently Russian production, which fell by half after the breakdown of the former Soviet Union, has started to rise and is projected to continue rising for years. Russia is already the world's third largest producer and second largest exporter of oil. Yet the Persian Gulf producers led by Saudi Arabia still account for over a quarter of the world's oil supply and continue to be the key to the market.

The position of the United States in the oil market has gradually changed over time (table A). Its oil use leveled off during the 1980's as consumption responded to conservation measures and to the higher prices at the start of the decade. By contrast, U.S. consumption rose 16 percent over the following decade. U.S. oil production declined slowly and its share of world production fell to below 12 percent in 2000 from near 24 percent in 1970. As a result of these different trends in consumption and production, imports have risen substantially and now provide half the U.S. oil supply.

Table A: U.S. Oil Consumption, Production and Imports, 1970-2000

	1970	1980	1990	2000
U.S. oil consumption (mbd)	14.7	17.1	17.0	19.7
Share of world consumption(%)	31.4	27.1	25.8	26.0
U.S. oil production (mbd)	11.7	10.8	9.7	9.1
Share of world production (%)	23.9	16.8	14.5	11.8
U.S. oil imports (mbd)	3.2	6.4	7.2	10.1

Share of consumption (%)	21.5	37.2	42.1	51.0

While that makes the United States more reliant than ever on imports, that reliance makes no meaningful difference to its exposure to crises in the oil market. Oil is freely traded around the world and cargoes get diverted to the highest bidder. So allowing for quality differences and transportation costs, oil is always available to the United States at the world price and, absent price controls, domestically produced oil sells at that same price. In the present situation, the risk to the U.S. economy comes down to how events affect the world supply-demand balance for oil.

The Likely Outcome for the Economy: Demand Effects and Oil Prices

The immediate economic impact of the terrorist attacks has been to depress the outlook for the U.S. and world economies by curtailing air travel and raising uncertainty. Most economists agree the U.S. and world economy are in a recession, though how long and deep it will be is unclear. This downturn in economic activity is noticeably reducing world oil demand. The Saudi led OPEC cartel[1], which still accounts for 40 percent of world supply, is negotiating, both with its members and with producers outside OPEC such as Russia and Mexico, to reduce production so as to stabilize prices.

Historically, OPEC's ability to control prices has been uncertain. At times the cartel's unity has eroded, leading to steep price declines. And over the longer run, as demand responded to higher prices and supply from other parts of the world expanded, the cartel has been unable to sustain the higher real price for oil it had achieved by 1980 (figure A). Today the cartel may have trouble getting the cooperative production cuts that would be needed with a serious world recession. Unless the Saudis themselves are willing to make most of the needed cuts, prices, which had fallen by $8 a barrel by late November, could fall noticeably further.

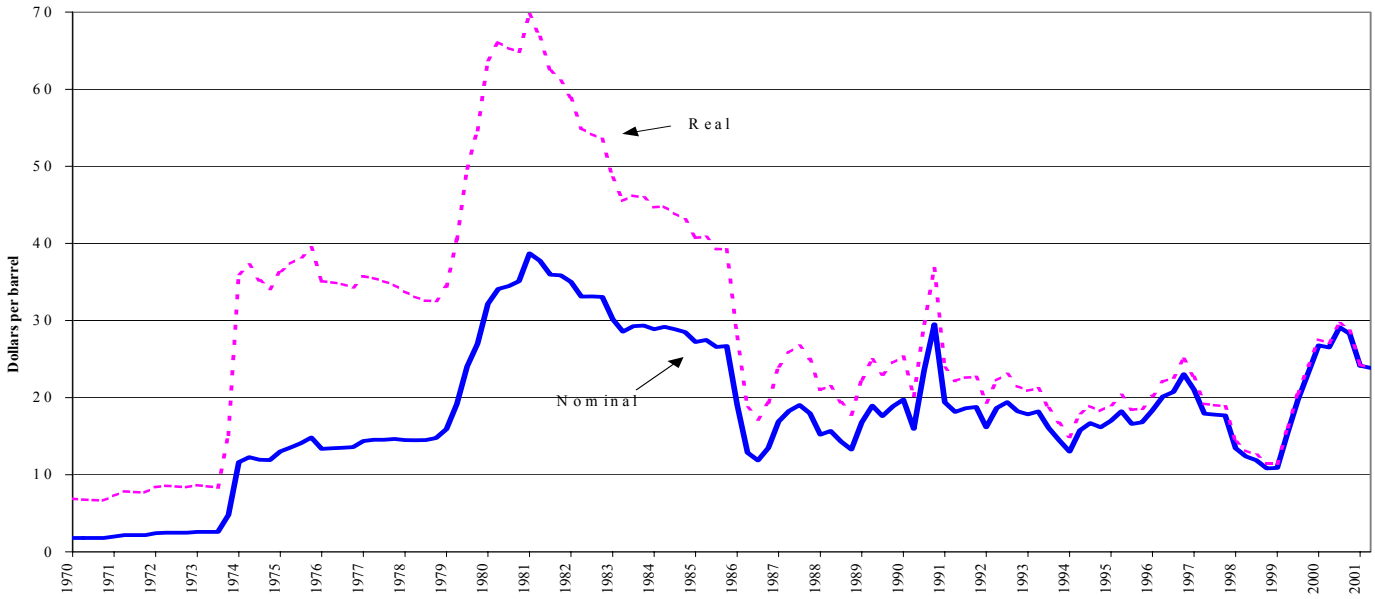
Supply-demand imbalances brought prices down to nearly $10 a barrel in the mid-1980's and again in the late 1990's. Today such a price decline would directly help the ailing airline industry, for which fuel is the main variable cost. And it would further slow the already low rates of inflation in the industrial nations, making it more likely that inflation-phobic central banks, like the European, would pursue aggressively expansionary monetary policies.

[1] Current OPEC members are Algeria, Indonesia, Iran, Iraq, Kuwait, Libya, Nigeria, Qatar, Saudi Arabia, UAE, and Venezuela. On some occasions of price weakness, Mexico has joined OPEC in reducing output.

Past Disruptions of Oil Supply

This outlook would change dramatically if a crisis disrupted an important part of the world oil supply. Past crises are a guide. The two largest recessions of the postwar period were associated with disruptions in the world oil market. In late 1973, in the context of the fourth

Figure A: World Crude Oil Prices, 1970-2001



1970-1973: Official price of Saudi Light Crude Oil. 1975-2001: Refiner Acquisition Cost of Imported Crude Oil, referred to as "the World Oil Price" by the Energy Information Agency (EIA). 1974: Average of above prices. All prices are quarterly averages. Real prices correspond to 2001q2 dollars. Source: EIA, US Department of Energy, www.eia.doe.gov; Bureau of Economic Analysis.

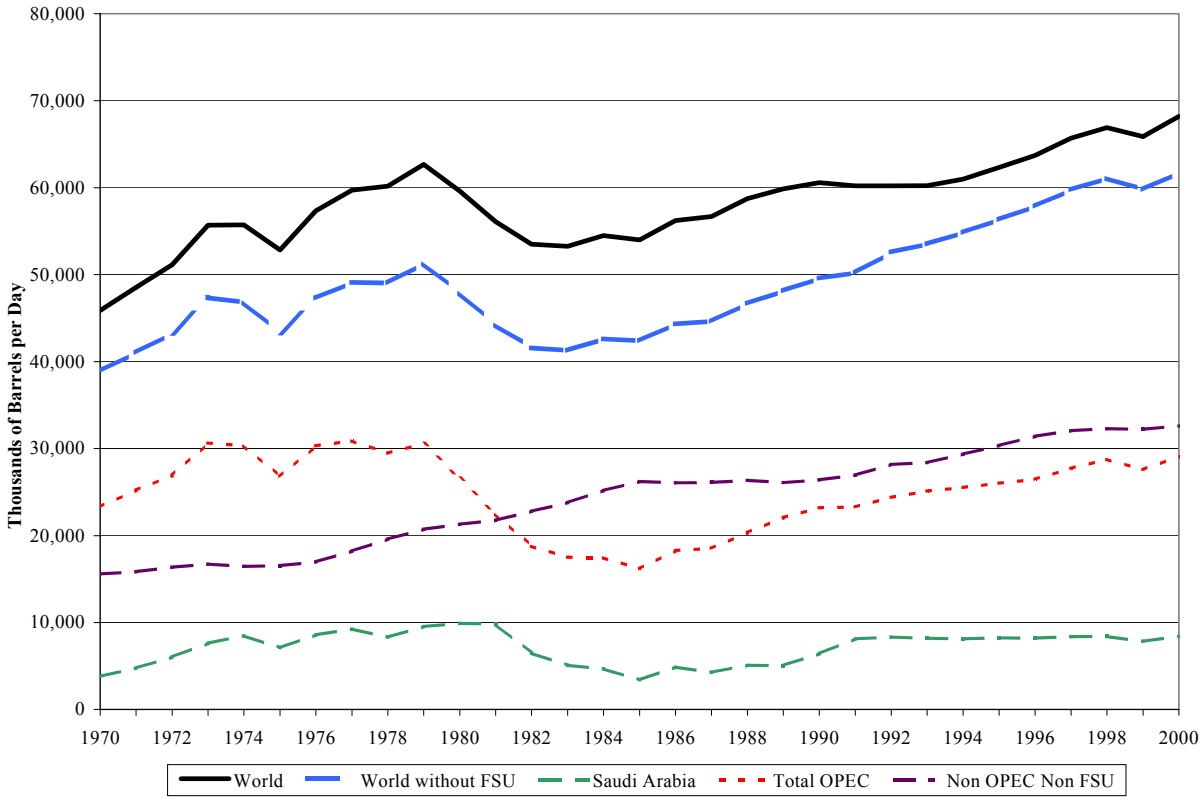
Arab-Israeli war, Arab oil producing nations announced major cuts in production, and an embargo of shipments to the United States and other nations supporting Israel. In December, the OPEC cartel raised the posted price of crude oil, which had been near $3 a barrel at the start of the year, to near $12.

The price hikes took even though OPEC production scarcely changed in 1974 (figure B) because the threat of reduced supplies raised fears of shortages and provoked precautionary inventory buildups by users. This experience led to the creation of the strategic petroleum reserve in the United States and to similar reserves in other industrial nations. Governments stockpile crude oil in these reserves and can then draw from them to add to supply in a future emergency.

This first big OPEC price rise was the main shock behind the deep recession of 1974-75, depressing the economy through two channels. First, it siphoned purchasing power away from consumers, much as the sudden imposition of a large excise tax on petroleum products would have. And second, by adding to an already high inflation rate resulting from surging food prices and the removal of the general price controls that had been imposed in 1971, it forced an even more protracted tightening of monetary policy than would otherwise have been needed.

The second OPEC price shock followed the overthrow of the Shah of Iran and the historic events that followed, which included the outbreak of war between two major oil

Figure B: World Crude Oil Production, 1970-2000



Includes Lease Condensate. Source: Energy Information Agency, US Department of Energy, www.eia.doe.gov.

producers, Iraq and Iran, in the fall of 1980. In a series of steps, OPEC raised its benchmark price to over $30 a barrel and market prices rose even further, staying above $35 for a time as

inventory buildups again worsened the supply-demand balance. The economic consequences for the United States and the rest of the industrial world were much the same as they had been in 1974—another massive recession. Inflation was again rising when the new oil price shock hit. And the Federal Reserve tightened monetary policy even more severely than it had the first time.

The Dangerous Outcome

Today the future is murkier and the role of Saudi oil less certain. The war on terrorism may some day bring lasting stability to the oil producing sates of the Persian Gulf. But for now, we have to consider the possibility of outcomes that could arise from instability in the region. These worse case scenarios are presently unlikely and will inevitably have an air of unreality about them. But then so did the September terrorist attack on the United States.

Unfortunately, such scenarios are easy to construct. Currently 28 percent of the world's crude oil comes from the Organization of Arab Petroleum Exporting Countries (OAPEC) consisting of Arab Muslim nations, some of which are not part of the OPEC cartel (table B). The governing regimes in all these countries are at some risk. If Islamist extremists had their way, they would control all these sources of oil. We would no doubt resist a disruption with force. But the resort to force would itself carry dangers that are hard to reckon and promise an uncertain future. While we cannot evaluate these broader dangers, examining the economic consequences of oil supply disruptions can illustrate what is at stake.

Table B. Oil Supply by Key Regions, 2000

	United States	Arab OPEC Core[2]	Arab Producers (OAPEC)	Total OPEC	World
Millions of barrels per day	9.1	13.6	21.7	30.9	76.9
Share of world (%)	11.8	17.7	28.2	40.2	100.0

[2] Saudi Arabia, Kuwait, United Arab Emirates, Qatar

Three Scenarios

- *As the bad case scenario*, hypothesize that the 8.1 mbd.of Arab OPEC oil, but not including the supply from Saudi Arabia and its OPEC core neighbors, Kuwait, the United Arab Emirates, and Qatar, comes under the control of extremists. Control could come about either through overthrow of governments or through coercive threats that secured the cooperation of governments. It could also include the 2.6 mbd produced by Iraq if they allied themselves with the religious extremists. Assume further that, where they control the supply, the extremists seek to damage the industrial nations by cutting output by 90 percent, which is coincidentally about the percentage decline in Iraq and Kuwait between 1989 and 1991. This scenario would take 10 percent of the world oil supply, or 7 mbd, off the market. Estimates of excess capacity in the rest of OPEC are not known with accuracy, but indications are they could promptly increase production by 3.5 mbd, and that may be low. So if they were willing—and that is a big if--they could make up half of a 7 mbd supply disruption, leaving a cut in world production of around 3.5 mbd.

- *As a worse case scenario*, assume the same disruption by extremists as before, but without a willingness by the Saudis and the rest of the OPEC core to make up any of the production shortfall. The Saudis have been a reluctant ally in the initial stages of the fight against the terrorists. On top of their long run ambivalence about the Israeli- Palestinian conflict, they worry about Muslim extremists in their own country where conservative religious leaders have attacked the Saudi royal family for its ties with the West. It would not be surprising if they chose not to respond to an oil disruption originated elsewhere by the extremists. In this case, 7mbd are taken off the market.

- *Finally, as a worst case,* assume extremists exert control over the entire 21.7 mbd production in Arab Muslim nations, and that they cut this production by 10 mbd. Iraq could be expected to join such an initiative. How plausible is this? Bin Laden and other extremists want most of all to overthrow the Saudi monarchy and the other dynastic rulers in the region. On the other hand, the United States would be expected to use military force to prevent it. Although a U.S. military occupation of the region could maintain oil supplies, it would have imponderable consequences for our relations with the wider Muslim world and

could prove unsustainable. Furthermore, apart from the particular scenario sketched above, 10 mbd of supply could conceivably be lost to some other combination of political takeover or coercion, destruction of facilities, and interruption of distribution. So its consequences are worth examining.

Strategic Reserves and Private Inventories

Under any of these disruption scenarios, or any others that would lead to large oil price increases, the United States, and other industrial nations could draw down their strategic reserves to supplement current production. The U.S. SPR contains about 570 million barrels of oil and roughly 700 million barrels are held in government reserves in other nations. There are now plans to expand these reserves, but that will take time. One problem that confronts policymakers in a crisis is when and how fast to draw down such limited reserves. In 1991, during the Gulf War, the U.S. quota for withdrawals from the SPR under a plan drawn up by the International Energy Agency was 1.1 mbd and the quota for all participating nations was 2.5 mbd. At those rates of withdrawal, and assuming 90 percent of the stored oil could be recovered, the SPR and foreign government reserves would last 5 quarters.

While faster withdrawal rates may be technologically feasible, they may not be economically prudent. Withdrawals of 2.8 mbd here and 6.4 mbd by all participating nations would deplete the reserves in 6 months. But before then, the oil industry and private users would anticipate the impending exhaustion of reserves and build up their own stocks cancelling the benefits of drawing down official reserves. So I will assume that in a new emergency the strategic reserves would be drawn down at the same rate as they were during the Gulf War, leaving much less incentive to build private stocks against the day the reserve is exhausted.

Effects on Oil Prices and the Economy

The economic impact of a disruption in oil supplies would come largely through higher world oil prices. In the short run there is little scope either for substituting away from oil to other energy sources such as coal, natural gas and hydro and nuclear power, or for economizing by changing the capital stock. So the short run demand for oil is highly inelastic, with a realistic estimate in the first year of perhaps 0.05, which means a one percent cut in supply leads to a 20 percent rise in price. This full impact of the supply shock on the oil price will be somewhat attenuated as depressed GDP reduces oil demand. How much GDP drops will depend, in part, on how accommodating the Federal Reserve is. I take the response in past crises as a guide,

but allow for the fact that the economy has been much less inflation prone in recent years than it was in the 1970's, so that monetary policy can afford to be somewhat more accommodating. The resulting outcomes for the three disruption scenarios are given in table C.

Table C: Oil Supply Disruptions and the Economy

	Bad Case	Worse Case	Worst Case
World production shock (mb/d)	-3.5	-7	-10
Less: supply from reserves (mb/d)	2.5	2.5	2.5
Net supply change (mb/d)	-1	-4.5	-7.5
Crude oil price ($/b)	32	75	161
Gasoline price ($/gallon)	1.76	2.78	4.84
Change in real GDP (%)	-0.59	-2.69	-4.55

Note: Assumes initial U.S. landed price of $25/barrel, gasoline price of $1.60/gallon, and short term demand elasticity of -0.05.
Sources: Energy Information Agency, International Petroleum Monthly, historical series; Bureau of Economic Analysis.

- The bad case poses no great problems. With oil from official reserves offsetting most of the supply disruption, the oil price rises only $7 per barrel and gasoline prices rise $0.16 rise per gallon (with similar increases for other fuels). This is well within non-crisis variations we have observed many times.

- The worse case, however, has important bad impacts. Oil prices rise to $75 per barrel, double their previous highest level, and gasoline prices rise to $2.78 per gallon. This shock would add perhaps 5 percentage points to the overall inflation rate the first year and would be likely to cause or deepen recessions in the United States and throughout the world.

- The worst case brings devastating economic problems. Oil prices rise to $161 per barrel driving gasoline price to $4.84 per gallon. The increase in the nation's bill for products of crude oil rises by about 10 percent of GDP, which adds perhaps 15 percent to the inflation

rate in the first year. And the recession is the steepest and deepest of the postwar period, with GDP declining nearly 5 percent the first year.

These scenarios all involve great changes in wealth. To simplify exposition, assume the extremists not only gain control over the amounts of production described in the three scenarios, but also get control of the revenues from that production. Table D summarizes their annual oil revenues. The first two scenarios give control over $74 billion a year, though actual revenues are reduced sharply by the cutbacks in production. The third scenario, which includes control over all the Arab Gulf oil, gives control over $198 billion a year, and this increases to $689 billion a year as the cutbacks in production raise prices proportionally far more than production is cut.

Table D: Revenues from Seizing Control, Three Scenarios
(billion $/year)

	Before production cut	Change from cutting production	After production cut
Bad case	74	-61	13
Worse case	74	-44	30
Worst case	198	491	689

Main Messages

One main conclusion is worth restating: an oil crisis is unlikely to add to the other difficulties of the current fight against terrorism. Indeed, the early military successes in Afghanistan make it even less likely than it would have been if the pessimists had been right when they warned that Afghanistan could be a quagmire for the United States as it was for the Soviet Union in the 1980s. However as U.S. officials keep reminding, the campaign is far from over. Until it is, Persian Gulf oil supplies will remain at risk, especially if the war somehow inflames anti-Western sentiment in parts of the Arab Muslim world. And if oil supplies are interrupted, as in the bad scenarios just described, there is little we can do to avoid the consequences for oil prices and the economy.

The present situation will encourage initiatives to enhance domestic oil supplies and to override environmental concerns. But significant new supplies will only come from abroad. Tax incentives for domestic production would be inefficient and largely wasted, and conflicts

between energy development and environmental concerns should be resolved on their merits and not decided by emotional reactions to the present conflict. Energy conservation by consuming nations, especially by the United States which is the most profligate user of petroleum fuels, has considerably more potential. Together with the expansion of oil supplies from areas other than the Persian Gulf, serious conservation efforts could gradually diminish the importance of Gulf oil and thereby reduce the risk of a future crisis. Unless and until that happens, Gulf oil will continue to be a potential source of instability and must remain a major concern of national foreign policy.