

## **The End of Cheap Oil, Once Again: Geopolitics or Global Economics?**

**by Bernard E. Munk**

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Oil shocks in 1973 and 1979-80 made “geopolitics of oil” the byword to describe the sources of uncertainty surrounding oil supplies and prices.<sup>1</sup> Today, while geopolitics is not absent from the current oil shock, it is global economics that drives oil prices. In a world oil economy highly influenced by national oil companies, there are inevitable boundary issues, and, in that sense, geopolitics still has a role to play. However, it is only a partial role, secondary to the fundamental economic drivers of the global economy. It is the emergence of more than three billion energy-hungry consumers of petroleum products, coupled to the disappearance of sufficient excess supply capacity, that has made for a very different world petroleum economy, the more so since American consumers’ fuel appetite has shown no abatement.

Economics has pushed geopolitics to the sidelines in understanding the current world petroleum economy. This oil shock is demand driven, which makes treating it different and in some ways more difficult than treating the shocks of the 1970s. It also involves concerns over the adequacy of the world supply because of insufficient spare capacity related only in part to political restrictions. This combination of demand and supply factors makes this oil shock more comprehensible in terms of economics than prior shocks with political roots. That said, however, if the longer term contours of global growth cause a serious erosion of supply capabilities and unsatisfied demands for petroleum products, geopolitics may well rear its head again. Emerging nation-states

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<sup>1</sup> While the 1973 shock was explicitly political (the Arab embargo followed the October 1973 war), a supply shock had been brewing in the late 1960s and early 1970s, with global demand for petroleum beginning to outstrip world output capabilities. Some major oil companies, such as Shell, foresaw the developing imbalance, but the true driver of change was the “resource nationalism” that took the control of oil resources away from concessionaires and into the hands of national oil companies. Also, the Soviet Union had been attempting to play a major role in Egyptian rearmament prior to the 1973 war. The subsequent inflation was aggravated by a huge policy error by the Federal Reserve under the chairmanship of Arthur Burns. The beginnings of stagflation stem from these policy errors, a legacy that the Fed never forgets.

In the second shock of the 1970s, the overthrow of the Shah and the Iraq-Iran War that followed took substantial barrels out of the world’s supply of crude. However, there was more than enough existing spare capacity to overcome this loss, even though prices rose dramatically. In addition, the U.S. policy response was much better. Fuel prices rose dramatically, but there were no rationing-induced disruptions, although the existing “control” system on oil in the U.S. was disruptive from an allocative standpoint. In January 1981, the Reagan administration dismantled the “old-oil/new-oil” regime, precipitating a dramatic fall in the price of crude. Without that change, the economy’s adjustment would have been far more difficult. Still, the U.S. did suffer a recession again, and the visceral connection between oil shock and recession was established. This connection deserves much closer inspection. The source of the shock and how it is handled (market or state response) make a huge difference to economic growth. A true demand shock, as opposed to a supply disruption, can and does have significantly different macroeconomic consequences.

would have to compete for higher-cost supplies of petroleum and petroleum products, largely because their oil sectors are state-dominated.

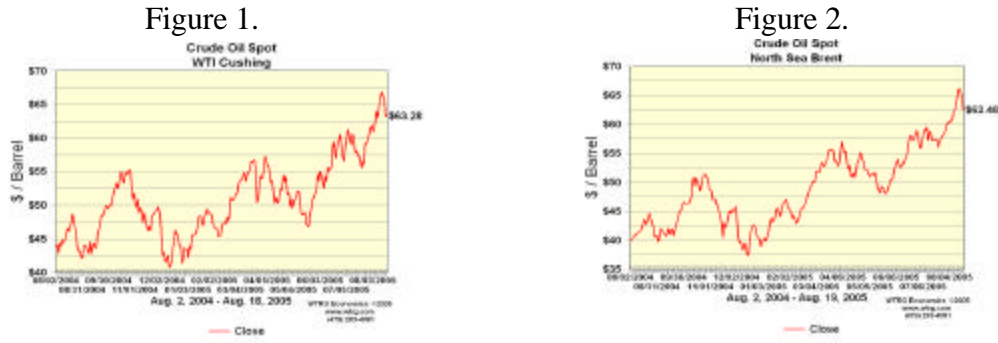
The “commanding heights”--the ever-changing border between state and market--applies to the oil economies of many nations. The growing dominance of the state in the governance of oil supply and production has permanently upset the old oil price paradigm. The resource nationalism of the 1970s has given way to strong, well-financed national oil companies that can dictate the terms of entry for international oil companies and/or perform their own exploration and production (E&P) activities. The world of oil concessionaires has shrunk, while national production volumes are now a matter of state policies that answer to many more constituencies than the treasury of an absolute monarch. The growing dominance of the state in oil policy is ironic, because it was the privatization of former state-run economies that was one of the prime drivers of global growth, the very global growth that has undermined the old oil pricing paradigm. Furthermore, bountiful oil revenues have in many ways prevented oil states (where oil policy is state policy, not a response to market incentives) from turning themselves into flourishing national economies on their own right, less dependent upon nature’s bounty. The oil curse has worked on both producers and consumers. In the case of producing states, it has deferred privatization and a fully flowering private economy centered on human capital accumulation. In the consuming countries, it has led to overwhelming political pressure to keep the price of petroleum products from rising, thereby removing much of the incentive to substitute away from the current dependency on fossil fuels.

The powerful ideology of markets has worked to restrain the incursions of the state in many older, private, developed economies, although the state becomes an active agent when prices become abnormally low or high. Even in market economies, there is no question that the free-market areas for oil and gas are shrinking relative to the expanding role of the state. It is the rare government official who does not feel that oil is too important to be left totally to the market. This makes market-oriented policies more difficult, because politicians wish to be seen as “dealing with the crisis.” It also means that petroleum prices are likely to go higher before they go lower.

As the border between the state and the market shifts, and national oil companies come to dominate the oil industry as a whole, the predictive power of profit-maximizing behavior is adumbrated. We cannot assume that the state values its reserves and its current production in the same fashion as would privately owned oil companies. Further, absent market disciplines applied by the financial sectors of a private economy, there is no clear way to evaluate the effectiveness of oil investment programs in national oil companies. On the contrary, rather than subjecting themselves to the discipline of the market, the national oil company states are victims of their own local politics. To see how this shift could impact the world oil economy, consider: how would the world price and world supply of oil differ from today’s if all the oil reserves were privately owned? Would E&P expenditures be different in state oil company countries and, if so, would they be higher or lower? Would production policies be different? Would more or less output be produced or would economic conservation be put into place by market dictates?

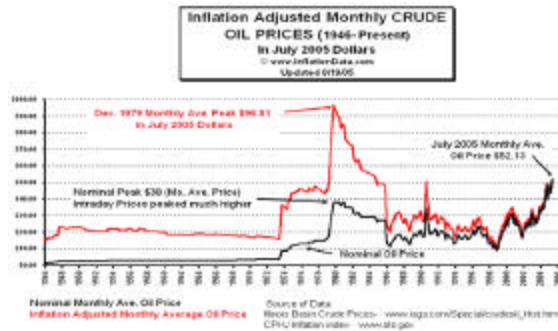
## Metrics of Oil Pricing and the Evidence of the Changing Oil Price Paradigm

Over the past two and a half years, crude oil prices (Figure 1) have been on a tear, recently reaching \$68/barrel on the New York Mercantile Exchange, which operates as a pivot for expressing oil prices throughout the world petroleum economy.<sup>2</sup> Similar price action has occurred in the Brent futures contract. (see Figure 2)



Three-dollar a gallon gasoline in the U.S. is becoming more common just when consumers were getting used to a \$2-gallon world. Oil savants speak of \$75/barrel as well within the current pricing environment, and some investment banks have touted the prospects of plus \$100/barrel oil. What was once deemed ludicrous now seems possible. How the recent price compares with disturbances in the past can be seen in Figure 3, which shows the oil price in real terms since World War II ended.

Figure 3.

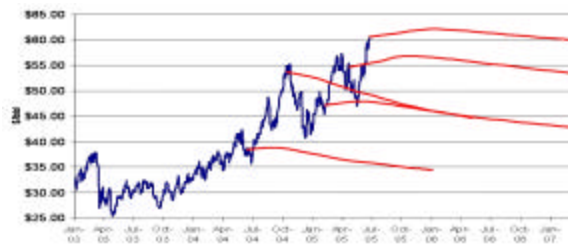


One metric of the change in oil market expectations is the “forward curve” shown in Figure 4. The forward curve describes the price of oil delivered one year, two years,

<sup>2</sup> In Spring 2005, when I gave these talks, the oil price was at least \$10/barrel lower and concerns were focused on the likelihood of a \$50/60 range being maintained going forward. Crude oil futures hit \$68/barrel on August 24, and the market has outrun our fears at that time. The doomsday scenario of \$100/barrel oil that seemed so distant then is much closer today.

etc. forward at a given moment in time.<sup>3</sup> In the past, the forward curve was “backwardated”—i.e., spot oil prices exceeded forward prices. That backwardation has waned, replaced by a small contango has emerged, in which forward prices exceed spot prices (at least in the immediate forward years). This has spurred the growth of private (and public) inventories, itself heightening the current demand for oil and no doubt raising the overall price of oil, while at the same time creating some capability for buffering immediate, physical shortages. Frequently, seasonal components embedded in the current demand for oil make it difficult to use backwardation or contango to chart forward expectations. But when the contango spreads out over several years and the far-forward prices elevate or even exceed the current spot price, something dramatic has occurred in market expectations. That is what we are now seeing.

Figure 4. Forward Curves Over Time



Furthermore, during the present spike, the difference between the far-forwards and the current spot price is negligible. In the past, the spot price often soared far above the forward curve, a phenomenon that expressed the market’s view that the spike was temporary. Today’s forward curve shows continual elevation, particularly at its longer end. Notice (in Figure 4) how the far-forwards in July 2004 were some \$4-5 below the spot price, a differential that was further exaggerated by October 2004. By January 2005, however, that pattern changed. The most recent forward curve illustrates that the gap between spot and forward has narrowed *while the price of spot crude oil has risen*. In effect, the oil market is saying that a return to cheap oil prices is unlikely. The market can be wrong, of course, but betting against this market has proven very expensive. That is true for consumers and users, and more so for the nation.

If the era of cheap oil has ended and the genie of vastly higher energy prices is now out of the jug, could any event put the genie back? A return to the old world of cheap oil in the \$20 range seems a remote outcome, despite the protestations of, among others, Exxon-Mobil, the world’s largest energy company.<sup>4</sup> Even the Chairman of the Federal Reserve has not dismissed the impact that energy prices can have on the

<sup>3</sup> Diagram courtesy of Edward Morse at HETCO and to whom I am deeply indebted for his comments on an earlier draft.

<sup>4</sup> Lee Raymond, who has announced plans to retire as chairman of Exxon-Mobil at the end of 2005, has long argued that the current price environment is merely a spike and that oil prices will fall back to a normal level, which in Exxon-Mobil’s case is probably below \$25/barrel. One can speculate whether his rather fixed stance, which precluded many otherwise attractive E&P locations in the face of the shocking upward spiral of crude oil prices, provided the board a timely opportunity for his retirement.

prospects for economic growth.<sup>5</sup> Whether market incentives will suffice to induce sufficient supply response depends upon non-market considerations—specifically, the response of the oil states. Serious concerns have now developed that the supply is on the down slope of “Hubbert’s Peak,” the predicted peaking of world petroleum production.

One more metric for the drastic change in the pricing environment has been Chevron’s bid for Unocal, which the latter agreed to on August 10. To lift its bid for Unocal, it appears that Chevron implicitly valued the Unocal reserves using a \$35/\$40 marker, a far cry from the days when Majors used a \$17/\$20 long term oil value. The unsolicited bid for Unocal from CNOOC (the Chinese company that raised the specter of a state-financed resource-buying binge by the Chinese), which was higher than the accepted bid from Chevron, triggered a firestorm in the Congress. Many legislators feared that state oil companies would deprive the U.S. of energy security and ignore the total world supply of oil, which is what drives the level of oil prices. It is oil supply growth relative to the total world demand for oil, not which particular company owns and develops the production, that determines energy security for everyone. The U.S. can’t have “energy security” if there is no spare capacity, no matter who owns the oil field. But the picture of a Chinese national oil company’s buying an ostensibly American international oil company fits neatly into Washington’s growing fear of China as an economic power. Washington’s not-so-thinly veiled protectionist feint forced the public to take its eye off the real issues that the current oil price shock raises: how fast do world oil supplies need to expand to keep oil prices from rising further, and can markets be relied upon to produce that supply growth?

The drivers of change abound in the Chevron-CNOOC controversy: (1) the absence of sufficient excess crude oil production capacity, and (2) the steadily increasing demand for crude oil and petroleum products, led by the rise of both China and India as major economic powers. Despite low per capita incomes, these nations’ very size makes growth in their demand for oil a huge influence on prices, an influence that will not quickly wane. China experts often refer to the “automotive” model that drives Chinese industry. Energy experts may rail against China’s strategy given its implications for high Chinese petroleum consumption, but the Chinese are merely following America’s industrialization path.

## **Supply Adequacy**

Judgments on the length of time it will take to create sufficient new crude oil production and to reduce the current spot price of oil are frequently based on conjecture, since there is insufficient, credible data. Oil markets suffer from a lack of transparency when it comes to production and reserve data, and even the consumption data outside of the OECD is suspect. As to production and the current state of known oil reserves, price escalation has triggered concern that world production cannot not rise significantly in the

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<sup>5</sup> “We are unable to judge with certainty how technological possibilities will play out in the future, but we can say with some assurance that developments in energy markets will remain central in determining the longer-run health of our nation’s economy.” Alan Greenspan, “Energy,” Remarks by satellite to the NPRA, San Antonio, April 5, 2005.

future. That is not the view of the U.S. Energy Information Administration, but the case for supply concern is real enough, and futures markets reflect that concern.<sup>6</sup>

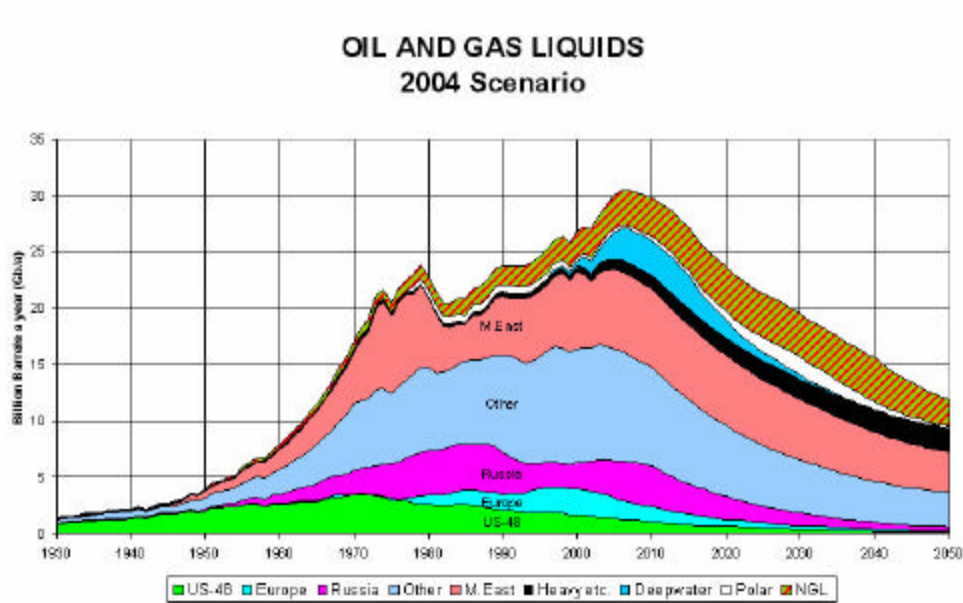
The most extreme case for the peaking of world oil production comes from the work of Colin Campbell, the petroleum geologist whose 1998 article in *Scientific American*, “The End of Cheap Oil,” alarmed many. Few petroleum experts subscribe to his dire forecast, but a growing body of work suggests that the case for “peaking” could be stronger than was once thought. Energy planners can disagree as to the exact timing of the peak, but markets now take more seriously the possibility that the crude oil supply cannot continue to grow endlessly. The EIA believes that peaking is still a few decades off, but even their optimistic scenario builds upon many assumptions concerning existing oil in place (the amount of oil that geological data suggest for the total volume of oil underground--this is clearly much more than the amount of oil that can be recovered, sometimes by a factor of three or five or even ten), the possible recovery strategies, the course of future crude oil prices, and various world economic growth scenarios. What oil remains to be discovered and how hard it will be to recover it is also largely conjecture. This is not an environment friendly to rational public policy efforts to cope with much higher energy prices because with the high degree of uncertainty around all of these calculations, hysteria can easily replace common sense.

A critical issue is the growing uncertainty that seems to be reflected in the pricing of crude oil. This “uncertainty premium” is difficult to estimate, but some would put it between \$5-10 per barrel. And this premium is unlikely to be dispelled soon. As prices rise, market participants come to believe that the underlying scenario of Hubbert’s Peak may be at the root of this vast price disturbance: that production is peaking, which means that less oil will be available each year, even if oil is still produced for the next century. This adds no science to the issue, but it helps some market participants justify their “book,” or net long-short position. Because we cannot be sure how much of the price reflects an uncertainty premium, it is virtually impossible to say what a “normal” price of oil will be in the near future. Some of the alternative peaking scenarios are shown in Figure 6.

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<sup>6</sup> “Not soon, but within the present century,” slide 2 in presentation “When Will World Oil Production Peak, by Guy Caruso, head of U.S. EIA, Kuala Lumpur, June 2005.

**Figure 5. Peaking Scenarios**



**Figure 6. Alternative Peaking Scenarios**

Published	By	Peak Year/Range	Published	By	Peak Year/Range
1972	ESSO	About 2000	1999	Parker	2040
1972	UN	By 2000	2000	Bartlett	2004 or 2019
1974	Hubbert	1991-2000	2000	Duncan	2006
1976	UKDOE	About 2000	2000	EIA	2021-2167; 2037 most likely
1977	Hubbert	1996	2000	IEA (WEO)	Beyond 2020
1977	Elftech, et al.	2008	2001	Duffeyes	2003-2008
1979	Shell	Plateau by 2004	2001	Goodstein	2007
1981	World Bank	Plateau around 2006	2002	Smith	2010-2016
1985	Bookout	2020	2002	Campbell	2010
1989	Campbell	1998	2002	Covello	2006-2009
1994	Ivanhoe	OPEC Plateau 2003-2080	2003	Greene, et al.	2020-2030
1995	Petroconsultants	2006	2003	Laherrere	2010-2020
1997	Ivanhoe	2010	2003	Lynch	No visible peak
1997	Edwards	2020	2003	Shell	After 2025
1998	IEA (WEO)	2014	2003	Simmons	2007-2009
1998	Campbell/Laherrere	2004	2004	Bakhtari	2006-2007
1999	Campbell	2010	2004	CERA	After 2020
1999	Odell	2050	2004	PFC Energy	2015-2020

**Crude Oil Capacity or Refined Petroleum Products Capacity?**

Crude oil has two broad uses: transportation and power/heating. The latter raises less serious problems because many technologies are available that could offer substitutes for electrical power/heating generated by oil or gas. Each of them has some environmental component, so local politics more than global economics will determine how well we can adapt to higher oil prices in supplying electrical power/heating.

During the 1980s, the U.S. was said to have a gas bubble, as the price of natural gas seemed frozen for years at \$2/1000 cubic feet or less. Partly to help U.S. producers and partly in response to the demands of environmentalists for cleaner fuel, natural gas

became the *fuel du jour* of utilities in the 1990s--just in time for markets to realize that the gas supply bubble had largely disappeared and reliance on larger and larger finds in the Gulf of Mexico were going to be prove troublesome over time. Some relief on the natural gas side will be found no doubt with the building of many more liquefied natural gas (LNG) terminals that can serve the U.S. market. At \$7-10, there are huge incentives to build the requisite refrigerated shipping and gasification plants to connect international LNG supplies to the U.S. natural gas market. How fast that occurs will depend partly on environmental politics and partly on the prevalence of high-cost domestic natural gas. Clean coal also offers some hope for the future, and clearly nuclear power is an alternative, although both of these fuel sources involve sticky environmental politics. Electrical power generation is largely a matter of political will, less a matter of international supply availability. Nonetheless, the transition will not be rapid or quiet.

A successful transition may be far more difficult with regard to transportation fuels (gasoline, diesel, and jet fuel) unless we have entered a permanently elevated oil price environment. Petroleum is terribly efficient as a transportation fuel, but the world petroleum economy requires ever more sophisticated refining processes that can operate between the constraints of “clean” fuel, often locally mandated, and the increasingly “sour” crude barrel that can be supplied. To the extent additional supplies of crude oil become available, they will be disproportionately sour barrels. Significant expansions in processing units will be required to convert sour crude into clean fuel. What refinery expansion has been done in the U.S. since the 1970s has been largely upgrading existing refining facilities, often the only alternative within the local political, “not in my back yard” (NIMBY) environment that regulates the placement of new refineries. Adequate clean fuel supplies in the U.S. are caught between the balkanization of gasoline (the multitude of mandated gasoline specifications) and the NIMBY bias that governs the permitting of new refining capacity. Added to these obstacles is the historical fact that generally the profit has been in the crude barrel, not the refined product. In fact, geopolitics is being replaced not by global economics, but by an even more lethal combination of global economics and local politics. Between the two there is insufficient refining capacity and insufficient crude production capability on a worldwide basis. This constraint will become much more severe before it is finally solved by the brute force that typically accompanies state intervention. Reliance on the market tends to give way to state intervention whenever the oil prices are highly elevated. Congress can exhibit a Canute-like wish to roll prices down, but generally loses focus when hard choices *between constituencies* have to be made. The recent energy bill was a prime example of Congress’s tendency to walk away when the going gets rough.

### **Where Did the Spare Capacity Go?**

As oil barrel prices rose into the \$40-50s, many Wall Street economists came to view the lack of spare production capacity as a force itself for price uncertainty and upward price pressure.<sup>7</sup> Perhaps more now than in the past because of the suspected impact on economic growth alleged to stem from an oil shock, analysts came to feel that

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<sup>7</sup> Graphs courtesy of Deutsche Bank. The lhs measures OPEC production and the rhs (inverted scale) measures spare capacity.

as spare production capacity fell below 3 million barrels a day, the market became highly sensitive to day-to-day changes in estimated spare capacity.

Today, no one would argue that spare capacity is anywhere near 3 million barrels per day. It is probably less than one million barrels per day. Little spare capacity implies the full burden of sudden shortages or supply disruptions are reflected in current spot prices, and insufficient spare capacity also creates a premium of its own for the forward barrel, based on concerns with what could happen rather in such an event. With total consumption of oil now reaching in the mid 80 million barrels per day, even a two percent variation in production can cause a sharp, price spike.

We are in a price rationing environment that may be permanent, perhaps for the first time in the history of the petroleum industry. This is clearly a different environment as compared to the two politically induced price shocks of the 1970s. This is a demand shock, and about the only fundamental economic change that can reduce crude oil prices (aside from seasonal variation) is a massive fall in world demand for crude oil, at least in the short run. That would probably require a serious worldwide recession or at the least recessions in the key consuming markets, such as the United States. That does not seem in the cards at this juncture short of a huge policy shock in the developed world. Longer term, it will take a substantial and steady improvement in the overall supply of crude oil which in the context must mean the opening up of new fields in order to bring crude oil prices down substantially. There is talk in the market that much additional supply will show up by 2007, but the forward curves don't reflect that supposition.

### **Who Moved Our Spare Capacity?**

Some will blame Chairman Greenspan, who plans to retire in January 2006, for the disappearance of spare capacity. Despite the 1997 Asian financial crisis, the 1998 Russian crisis, the 2000 dot-com bust, 9-11, and the ensuing war on terrorism, U.S. economic growth has been exceptionally steady. The short recession of 2001 was lanced by a combination of aggressive monetary and fiscal policy measures, and the U.S. has been the engine of growth for the rest of the world. U.S. growth has translated into a veritable boom in China and India, together with what appears to be a quite reasonable recovery in Japan. Even Europe, despite its often somber prospects, has continued to grow. World GDP growth in 2004 reached 5.1%, the most rapid in the past 30 years, with world output reaching \$55.9 trillion in 2004 dollars as compared to 45.1 trillion in 1998. Even worldwide per capita income grew some 15% in the past six years. It is not surprising that the rest of the world's demand for oil has soared, but it is a bit surprising that U.S. demand has also grown. Despite higher prices and the oft-repeated forecast that oil shock would cause a large slowdown in U.S. growth, that has not been the case so far.<sup>8</sup> The growth of crude oil production has not kept pace, and the margin of spare capacity has fallen victim to the worldwide economic boom. Why?

There are many theories that purport to explain the slower growth in global oil production capacity. Since the demand shock was unforeseen, increased output has not

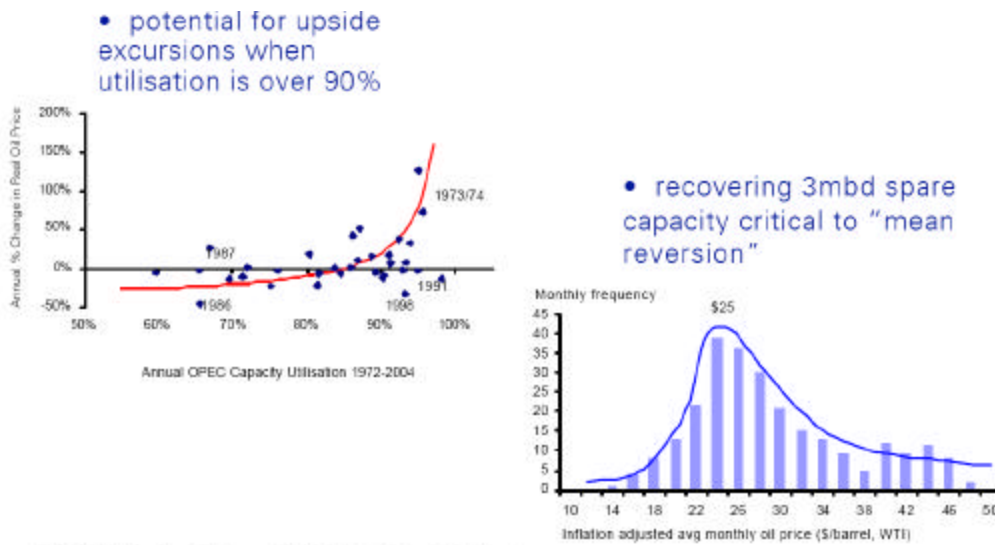
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<sup>8</sup> The conventional wisdom when crude began its escalation some two years ago was that it would cause economic growth in the U.S. to slow or even stop. We're still waiting for Godot, which tells us something about the fundamental difference between a demand shock and a supply shock.

followed apace. It takes about 8-10 years from the beginning of a drilling prospect until the oil reaches a pipeline from which it can move into the world petroleum economy. This capacity crisis has had long antecedents.

Before the Russian crisis, many thought that production from the territories of the former Soviet Union could be expanded relentlessly and offer a competitive supply to that of the Middle East. As it has turned out, production did rise in the FSU, but it appears that even that rise has been capped by the fallout from the Putin-Oil Oligarch struggles surrounding the Yukos affair. Other non-OPEC supplies have also not grown proportionately despite a sizeable ramp-up in E&P expenditures. But the costs of discovery are rising, and world output growth has fallen behind the demand surge. (See Figures 7 and 8).

**Figure 7.**



Source: US DOE/EIA; Bloomberg; US Bureau of Labor Statistics; Deutsche Bank estimates

**Figure 8. OPEC Production**



Source: IEA, DB Global Markets Research

For a number of years during which the margin of spare capacity fell, major international oil companies planned their forward exploration programs based upon a return to a \$20/barrel price. Furthermore, the economics for large oil firms dictates prospecting for “elephants,” as they are called in the trade--fields in the billions of barrels range. Unfortunately for the majors, the hunting grounds for elephants have been largely off limits. In the early months following the swift military victory in Iraq, many thought that Iraq’s oil prospects were so large that there would be a rush to develop large fields. Some even thought that the war was all about developing a counterweight to American dependency on Saudi oil. As it turned out, the virulence of the insurgency, combined with the failure to leave the development of the Iraqi fields to private concerns, has largely resulted in a stalemate on E&P activities. There may be Iraqi oil reserves, but bringing them to market is going to be a very long, drawn-out affair. Some additional supplies are being developed in the other Gulf States, but perhaps the biggest disappointment so far is the absence of a really meaningful improvement in output in Saudi Arabia. The Saudis have promised, but the markets are still waiting for confirming evidence that they can actually maintain substantially higher levels of crude oil output going forward in sufficient amounts to quiet down the uncertainty premium. Even if they can, it is still hard to envisage a true price collapse short of a major world recession. Saudi expansion is

unlikely to be the source of a new crude oil price collapse, even if building in some spare capacity can be in their political interest. Cartels work through the threat of discipline, and spare capacity provides that discipline.

### **Can High Prices Cure the Shortages?**

There are many ironies in the current oil situation. High prices encourage the search for oil alternatives, and the estimates of proven reserves go up. Yet those companies and states that seem to be technically and financially well equipped to quickly expand production are often afraid to make the monumental commitments that truly enlarged E&P programs require. Investing at the tail-end of a boom has a notorious history, and the history of the petroleum world is replete with the wreckage of companies that thought high prices would last forever. As Warren Buffett put it, 'You only find out who was swimming nude when the tide goes out.'

After the last supply shock of 1979-80, crude oil fell to \$10/barrel by 1986 as the missing Iranian and Iraqi production returned. The collapse took with it many portions of the entire petroleum complex. A second downturn occurred following the Asian/Russian crises, when the world economy seemed to totter. Companies that built rigs foundered and were merged into larger aggregates. In the ensuing rationalization, some majors were absorbed into the mega-majors, but exploration budgets were slashed. The human capital needed to implement modern petroleum geology, geophysics, and petroleum engineering was not fully replaced. The tech boom of the 1990s seemed to be a better place for the technically adept and reducing operating costs was the order of the day as Wall Street pressed executives of oil companies to trim expenses and improve returns to prove the mergers worked. With the currently elevated prospects of high returns, there is now a scramble to find rigs, hire oil technologists and compete for new areas for exploration.

Of course, low prices are also valuable as a stimulus to improve petroleum engineering, and the 1990s saw an immense improvement in oil companies' ability (both public and state-operated) to do better with the fields they were already developing and/or producing. 3D seismic technology and horizontal drilling, along with huge improvements in ocean drilling rigs that could conquer immense undersea depths, were pushed into the exploration arena by oil companies' need to become more adept at not only finding oil but also stripping the already located oil fields of their precious contents.

As prices began to recover, the combination of new production techniques and better oil prices brought some of the more difficult (non-conventional) crude oil sources into prominence. A perfect example is oil recovered from the tar sands in Canada. Canadian production has grown significantly in the past few years, and, subject to the price of crude oil, can be expected to increase much more. Tar sands production now represents half of Canada's total crude oil output, which could mean more than one million barrels crude-equivalent per day. In theory, quite a bit more non-conventional oil could be developed, and there is an investment boom going on now in the Canadian tar sands to do just that. There are clear technology issues involved, such as finding adequate diluent to cut the oil retrieved from the sands, adequate water and natural gas to process the sands, and sufficient technological advances that can cope with the large quantities of carbon dioxide. The proposed solution to these issues will have to satisfy various

environmental interests. It will not be an easy road, but Ottawa is encouraging these developments. As the price of crude has soared over the past two years, more and more investment resources are being committed to this area, as well to some exploratory work on oil shale in the U.S. While tar sands represent a high-cost source of oil, since the oil has to be literally cooked out of the sands, at least it is a “safe source.” At current prices, production will expand dramatically. Despite numerous provocations in other areas of U.S.-Canadian trade, Canada has not so far restricted the expansion nor the export of the synthetic crude that is produced from tar sands.

Similarly, with higher prices, large deposits of bitumen such as those in Venezuela become more attractive, but here the geopolitics of oil can come into play. Venezuela under Chavez has moved far away from its early 1990s friendliness to international oil companies. Many analysts believe, however, that the need to implement social and political programs in Venezuela will require substantial revenue and will entail much further development of bitumen production. The Chavez regime may not like the U.S., but its need for revenue will force it to develop its petroleum resources. Currently, Venezuela appears to want participation from American competitors, such as the Chinese, but the key here is for American policymakers to encourage oil developments even if non-American companies get the bids. Encouraging the growth of total world supply is in America’s interests.

Considerable effort is being expended to increase West African production, and no doubt, some of that effort will be successful. But the Oil Bulls point to two years of very high prices--much higher than the drilling budget parameters of the majors--with remarkably little new oil discovered or new incremental production. The relevant metric is of course supply growth against demand growth. Consequently, a great deal of hope is being pinned on efforts in Saudi Arabia, although even here, there is growing skepticism that the Saudis can actually fulfill the growing needs of world demand.<sup>9</sup>

### **Past and Present Policy Approaches**

Over the past five years, what passes for a U.S. energy policy is almost totally an effort to induce more U.S. production, through subsidies and tax credits, while making some concessions to environmental interests. The government’s providing resources can always find constituent support, but this is a one-bladed scissors approach. What does not fly in Washington is any attempt to restrict demand through higher taxes. It is as if “pain

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<sup>9</sup> Matt Simmons makes a well documented case that Saudis will not be able to produce anywhere near the amount of additional oil that world demand seems to need. Saudi expansion would require that the older giant fields produce a much higher sustainable level of output. His basic case is that these are already old fields, undergoing rising water “cuts,” and the history of how reservoirs follow well-known decline curves will play itself out in Saudi Arabia. The new techniques do add to current output capabilities, but in Simmons’ view, those techniques are just a more efficient “straw.” More will come out now, to be followed by steeper decline rates in the future. The sands, in time, will tell.

at the pump” is a signal to politicians that nothing will be done to use prices as a rationing tool on the demand side.<sup>10</sup>

Since gasoline is such a big part of U.S. demand for oil, much of the effort in the past has been on improving gas mileage. Corporate Average Fuel Economy (CAFE) standards are set to rise, and the cost of driving will rise if those standards entail more expensive automobiles. This may lessen the growth in gasoline demand, but there will be environmental offsets in the form of cleaner fuels that will actually cause the U.S. to demand more imported gasoline. The Strategic Petroleum Reserve has now been filled (now about 720 million barrels), but more authorizations would add to the net demand for more crude oil as will attempts by other countries to also create “strategic reserves.” Washington clearly has reacted to the \$60 cost of filling up the tank, both domestically and internationally, but the focus remains on increasing domestic supply, less on total world supplies, and nearly nothing has been done about restricting demand growth.

Missing is any use of prices to ration the available supply or effort to promote awareness that the likely sources of improvements in world supply will come from non-U.S. sources. Inevitably, this leads to an overemphasis being placed on geopolitics and leads to an evasion of political responsibility. The Chevron-CNOOC controversy is a perfect example. The key is total world supply, not just OPEC or non-OPEC suppliers or even the non-conventional areas of supply. Unfortunately, the message conveyed to the public was that the Chinese were a “threat” to U.S. energy security. That turned a positive-sum game into a zero-sum game. There has been no clear message to the public as to the importance of both increasing supply and retarding demand growth. Both are enhanced by high prices, and both can be defeated by legislative efforts to bring prices down through artificial means or by quantitative controls. The market can work to solve some of the problems, but it has to be permitted to work.

Enhancing supply growth worldwide is encumbered by increasing state-imposed restrictions on who can explore and under what terms and conditions. An interesting example is Libya, where, as a result of the denuclearization agreement, exploration opportunities have been opened after more than three decades. Unfortunately, the present Libyan “take” arrangements are rather punitive and will impede developments there. If the Libyans find that foreign participation in oil development is limited, they will likely change the terms. Sometimes markets work even for governments. The U.S. cannot dictate to overseas suppliers without treading on the issue of sovereignty. However, a multi-pronged attempt to increase trade and technology transfer to restrictive states can often improve bilateral relations on oil development.

The End of Cheap Oil is not a point in time but a contour of geologic and economic history. The issues get solved one barrel at a time. Rising prices create incentives for both rising prices and output to occur, and the public should understand the effect of rising prices on supply and on demand. A perfect example of this may be gas-to-liquids projects in the Middle East. Many large gas reservoirs there have no current local

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<sup>10</sup> Introducing a much larger tax wedge between prices that producers receive and consumers pay is arguably a sensible policy, if the purpose is to recapture some of the rising profits of foreign oil producers. This proposal leaves two issues to be solved, however: how is the revenue from such a tax to be handled, and what are the longer range consequences on producing countries of trying to siphon back some of the excess profits? Will foreign oil states be willing to endure further expansion if they see U.S. tax policy change?

market. LNG is one solution, and gas-to-liquids (GTLs) are another. But it will require relatively high prices for fuels to induce the very large capital investments both of these require. “Talking the price down” will impede such developments and leave us vulnerable to the next demand shock.

### **The Current U.S. Energy Dilemma**

It is always possible to ascribe the sources of the American energy dilemma to geopolitics and to cite the numerous restrictions that retard oil E&P. The timing of this shock, however, comes much less from growing geopolitical problems and more as a result of the acceleration of economic growth in large, populous areas that wish to enter the modern world on internal combustion engines. Unless there is some evidence that demands from emerging countries are going to soften on a secular basis, the world will simply need more transportation fuels. The question is how that will be accomplished. The irony in this oil shock is that the market is actually working quite well, at least in the U.S. We are not running out of fuels, and consumers are making the adjustment. Private inventories are building because it now appears economically efficient to store and hold inventory in the private sector. This is quite distinct from the 1973-74 crisis, which was fraught with controls, long lines at the pump, shortages and ultimately a recession. It is also different from the 1979-80 shock, because the spare capacity was there and prices fell when production resumed in Iran and Iraq. The dilemma is that it often takes a crisis to motivate political will, but a crisis that provokes controls will bring the one thing missing so far from this oil shock--a recession.

The fungible nature of crude oil means that the total availability to the world market, matters more than who owns the production rights. In a tight crude oil market, OPEC is no longer an effective supply restriction organization, although individual OPEC members may have interests in slowing the development of their oil resources from time to time. OPEC becomes interested in supply restrictions when non-OPEC oil supplies grow sufficiently fast to create effective excess world capacity. U.S. policymakers need to focus on those things that they can control. They have to convey the truth of the oil market to their constituents, painful though it may be. Preaching “energy independence,” which we can never achieve, is misleading and dangerous.

A demand shock is different from a supply shock. The latter is associated with a fall in output and a rise in price while the former produces both a rise in price and a rise in output. In one sense, the administration is to be complimented. It has not succumbed to temptation as did past administrations who attempted to physically restrict consumption in a shock. It is letting the market work, more or less. It has apparently learned that the great damage done in the oil shocks of the 1970s came less from the escalated prices and more from the restrictions placed on the market that prevented rational choices being made. That is a lesson worth restating and restating to the public.

The distribution of hydrocarbons around the world is part of the world’s geography. Washington can’t change that, but it can provide incentives to produce oil and reduce the growth in the demand for oil. Focusing on geopolitics is oftentimes a useful method of analysis. In this case, it is more fruitful to focus on the fundamental economics and the political economy. The fact that the world economy has not collapsed while the

price of oil has virtually tripled ought to suggest to even the most devout geopolitician that the law of supply and demand has not been repealed.

