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Global Oil Resources and the Persian Gulf: Security and Democracy

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Abstract

The oil of the Persian Gulf has been of considerable interest to oil companies and Western governments (and to Russia) for more than a century. Remaining global conventional crude oil resources are on the order of 3 trillion barrels, with more than 50% of that amount in the Persian Gulf. Since 1986, a price range framework has resulted in stable crude oil prices and reliable supply. In economic terms, it is a Nash game theory equilibrium between Gulf producers and Western (and Asian) consumers. Military support is an important part of the system.

Given the very low cost of production in the region (about $5 per barrel) and the great magnitude of resources, the oil wealth in the Gulf is on the order of $60 trillion. It is the existence of past and potential efforts to seize this resource which creates a major policy problem for the 8 countries in the region and for global security. The security framework which made a stable world oil market possible has itself contributed to growing instability in individual countries, the rise of Al Qaeda, and the U.S. occupation of Iraq.

There are three broad policy approaches to this dilemma. The dominant policy in the 1973-1990 period was generally a "hands off" position by the U.S. and Europe. In the years following the Gulf War (1991-current) a security system has been organized and led by the United States. A third type of security structure would be essentially international. The paper concludes by discussing each approach in the context of 6 conditions or requirements for democratic governments and a stable world oil market.

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Introduction

The map (Figure 1) illustrates the interactions of Persian Gulf oil and international security. Within this image are (a) 5 countries with nuclear weapons, (b) 3 countries where U.S. forces are engaged in military conflict, (c) the nationalities of 18 of the 19 hijackers who undertook the September 11, 2001 attacks, (d) more than three-fourths of the world's readily accessible proved petroleum reserves and more than half of the estimated total remaining oil, and (e) the location of 6 major recent armed conflicts that did not involve the United States.

I. Brief History: Petroleum, the Persian Gulf, and the West

Today's issues with security and oil have long roots. Turkey's Ottoman Empire controlled most of the region at different periods over a 7-century span in the last millennium. The slow disintegration of the Empire was accelerated by the search for oil for naval vessels by Britain and France early in the 20th Century. In the years after WWI, much of the oil regions of the Persian Gulf was under the production control of Western oil companies. Initially British Petroleum and the French Petroleum Company dominated the region, reflecting the European concern for secure sources of petroleum. By the 1950's, however, American oil companies had become full partners.[1] The organization of Western oil concessions was typical of natural resource production areas throughout the developing world for the time. One observer described the early oil concessions in this way:

"One would have a clear conception of the situation in Persia if one could imagine that Russian officers command the National Guard, French professors lecture in French, the Dutch own and manage the only bank, with a branch in every county, employing a large number of Indians. The British own and manage the only large industrial operation (oil). People would resent this state of affairs and try to change it."[2]

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1 See Figure 2 and Tables 1 and 2. Russia and the Soviet Union during this period sought to establish influence in the Persian Gulf, but were generally unsuccessful except for brief periods in Iran and Iraq.

2 Adapted from JM. Upton, *The Modern History of Iran* (Cambridge: Harvard University Press, 1961), page 32. Also pages 83-86 in D. Chapman, *Energy Resources and Energy Corporations* (Ithaca NY: Cornell University Press, 1983).

Figure 1. Persian Gulf Region

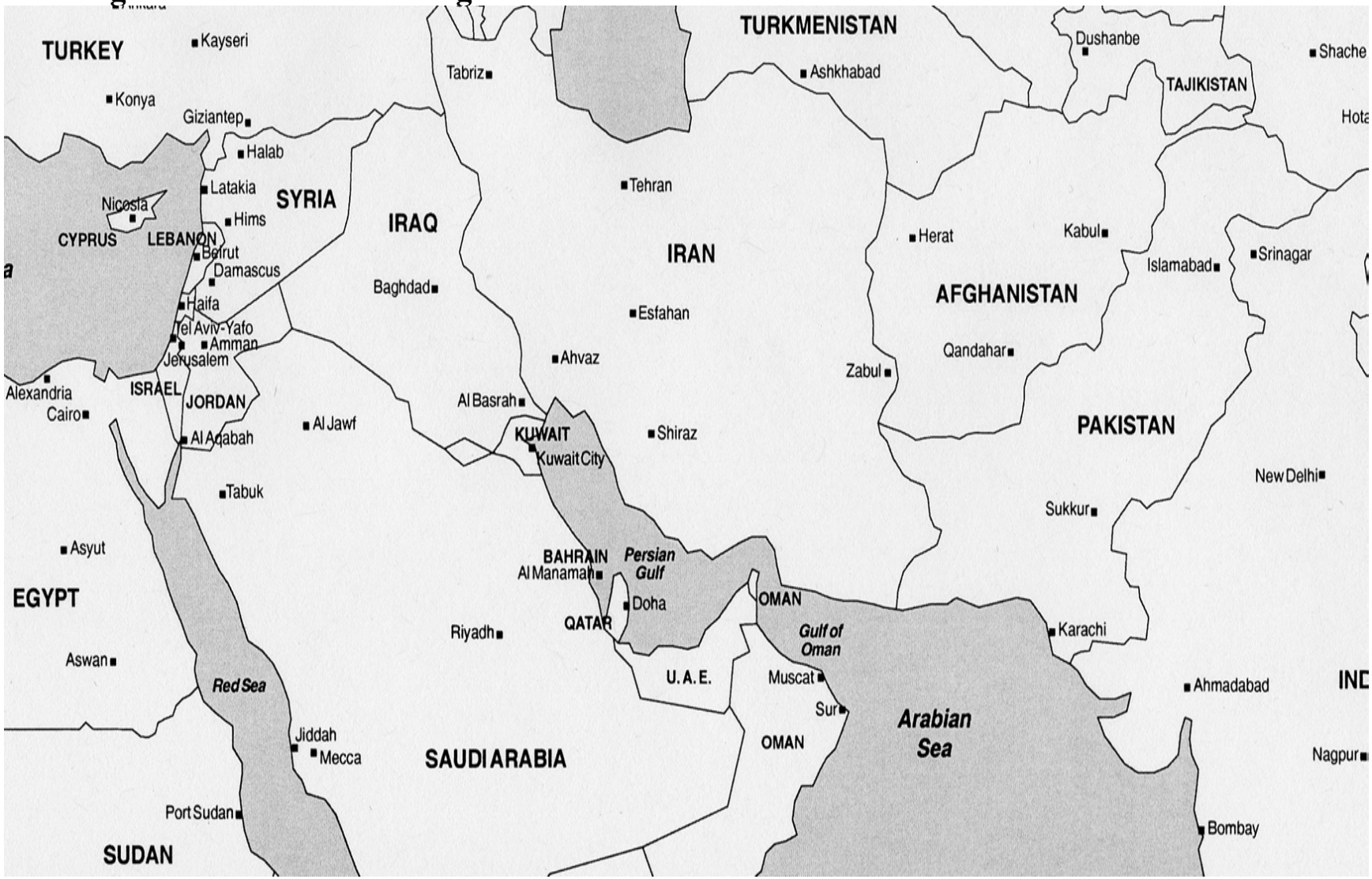


Table 1. Persian Gulf Countries: Notes on Government and Colonial History

Bahrain	British Protectorate from 1861 until independence in 1971. Monarchy. Al Khalifa family rule since 1783. Constitution, National Assembly created in 1973. National Assembly dissolved in 1975. In 1993, Consultative Council of appointed members formed. Government friendly to U.S.
Iran	Monarchy with significant British influence and parliamentary democracy to 1951. Conflict over oil nationalization until parliament democracy displaced by Shah monarchy in 1953 with assistance of US-CIA. Revolution in 1979 replaced Shah with an Islamic Republic, a combination of clerical theocracy and electoral democracy. The supreme spiritual leader has final authority in all executive, legislative, and judicial matters. Executive branch headed by an elected president. The Majlis is the legislative Consultative Body. Different parts of government hostile or open towards U.S.*
Iraq	Turkish control until 1906. A British mandate after WWI. Monarchy overthrown in 1958 by army with communist support. Ba'ath Socialist Party took control in 1968 with minor assistance from US-CIA. Saddam Hussein established dictatorship in 1979. Government hostile to U.S. until American occupation in 2003.
Kuwait	British protectorate until independence in 1961. Monarchy. Al Sabah family rule. Constitution in 1962 vests power in an emir selected from ruling family. Elected National Assembly exists but subject to dissolution or suspension by the emir. Government friendly to U.S.
Oman	Independence from Portuguese control in 1650. British protectorate from 1789 until 1951. Monarchy. Al Said family rule. In 1991, a Consultative Council of regional representatives was formed. Government friendly to U.S.
Qatar	Ottoman control from 1878 until World War I. British Protectorate until independence in 1971. Monarchy. Al Thani family rule. In 1999 municipal elections were held. Government Friendly to U.S.
Saudi Arabia	Independence from the Turkish Empire after WWI. Unification in 1932. Monarchy. Al Saud family rule. No elections or political parties. Consultative Council of appointed members initiates laws and reviews policy. Government friendly to U. S.
United Arab Emirates	Independence from Britain in 1971. Confederation of monarchies. Rulers of 7 constituent states (Abu Dhabi, Dubai, Sharjah, Ajman, Umm al-Qaiwain, Ras al-Khaimah, and Fujairah) participate in a Supreme Council which elects the President for 5 year terms. The Federal National Council is appointed. Government friendly to U.S.

Notes to Table 1

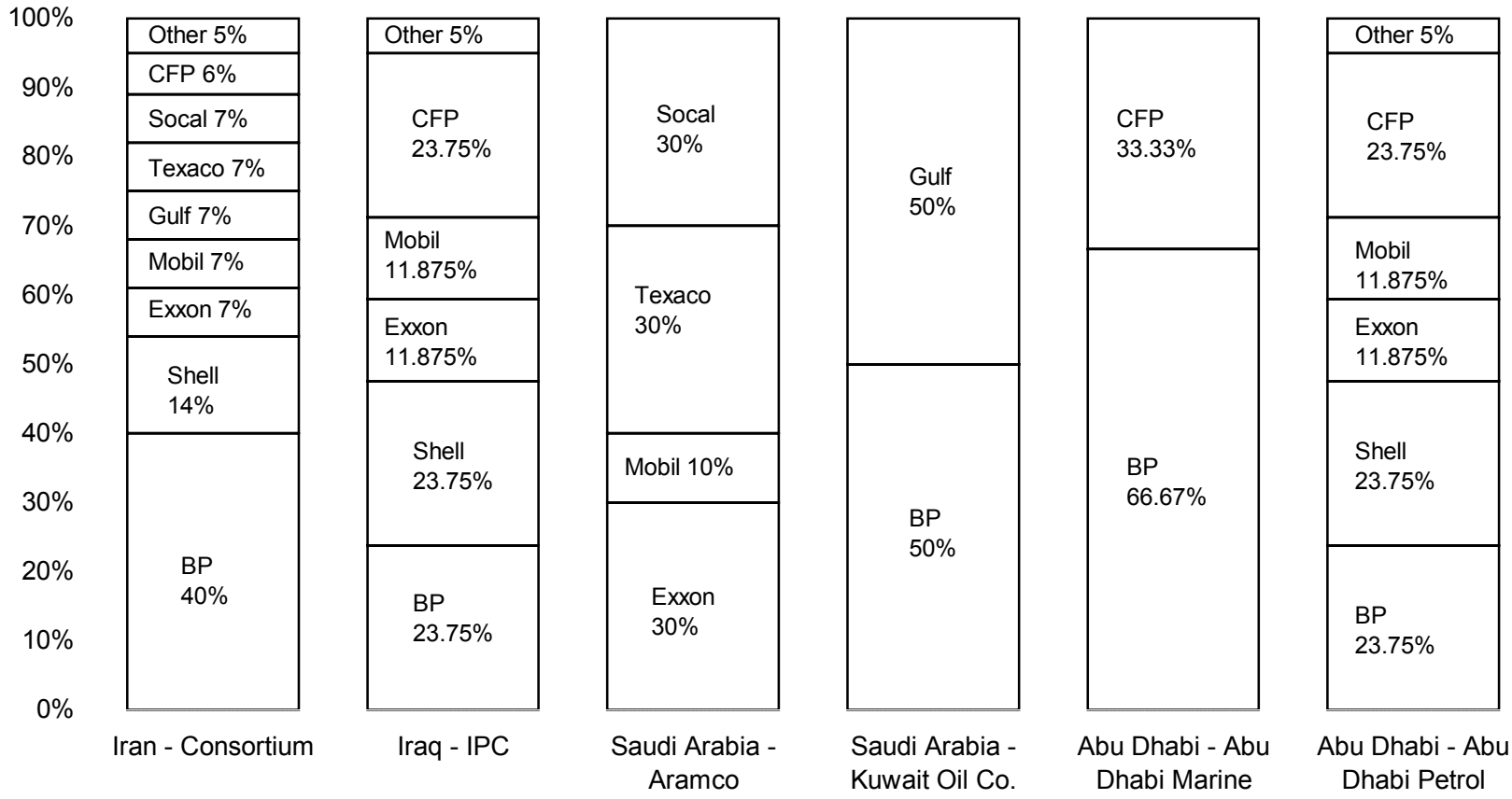
Primary Source: US-CIA, *The World Factbook 2002*; Accessed 3/2/03 - 4/4/03, <http://www.odci.gov/cia/publications/factbook/index.html>. Other Sources: Arthur S. Banks & Thomas C. Muller, *Political Handbook of the World* (Binghamton, NY: CSA Publications, 1999). *Encyclopedia Britannica* Online; Accessed 3/2/03-4/4/03; <http://eb.com/>. Lord Kinross, *The Ottoman Centuries* (New York City: Morrow, 1977). George T. Kurian, *Enyclopedia of the Third World*, (New York City: Facts on File, 1992). Roger Morris, "A Tyrant in the Making", *New York Times*, March 14, 2003. Kermit Roosevelt, *Countercoup: The Struggle for Control of Iraq* (New York City: McGraw-Hill, 1979). Anthony Sampson, *The Seven Sisters: The Great Oil Companies and the World They Made* (New York City: Viking, 1975). Daniel Yergin, *The Prize: The Epic Quest for Oil, Money, and Power* (New York City: Simon and Schuster, 1992). "*" means author's opinion.

Table 2. Historical Summary: Security, Production, Pricing

Broad Era	Military Security	Production & Pricing Decisions
I. WWI to 1950's	Britain	British Petroleum (BP)
II. 1950's to 1973 a. Suez Canal 1956 b. OPEC Oil Embargo 1973	none	Aramco,* BP, Shell, CFP, Texaco
III. 1973 – 1986 a. Iraq invades Iran oilfields, 1980 b. Bush Sr./Saudi price agreement, 1986	none	OPEC
IV. 1986 – 1990 a. Iraq invades Kuwait, 1990 b. repulsed by U.S. led UN coalition, 1991	none	OECD/OPEC first target price range
V. 1991 – 2002	U.S./U.N.	OECD/OPEC second target price range
VI. 2003 – current	U.S.	OECD/OPEC continue second price range
VII. (please see conclusion)	3 options	3 options

*Note: ARAMCO was the Arab-American Oil Company which operated in Saudi Arabia. The partners were Standard of California (Socal/Chevron) and Texaco, since merged; and Exxon and Mobil, also merged. See Figure 2.

Figure 2. 1972 Joint Oil Production Companies Composition



Source: Anthony Sampson, *The Seven Sisters: The Great Oil Companies And the World They Made* (New York: Viking, 1975), page 136.

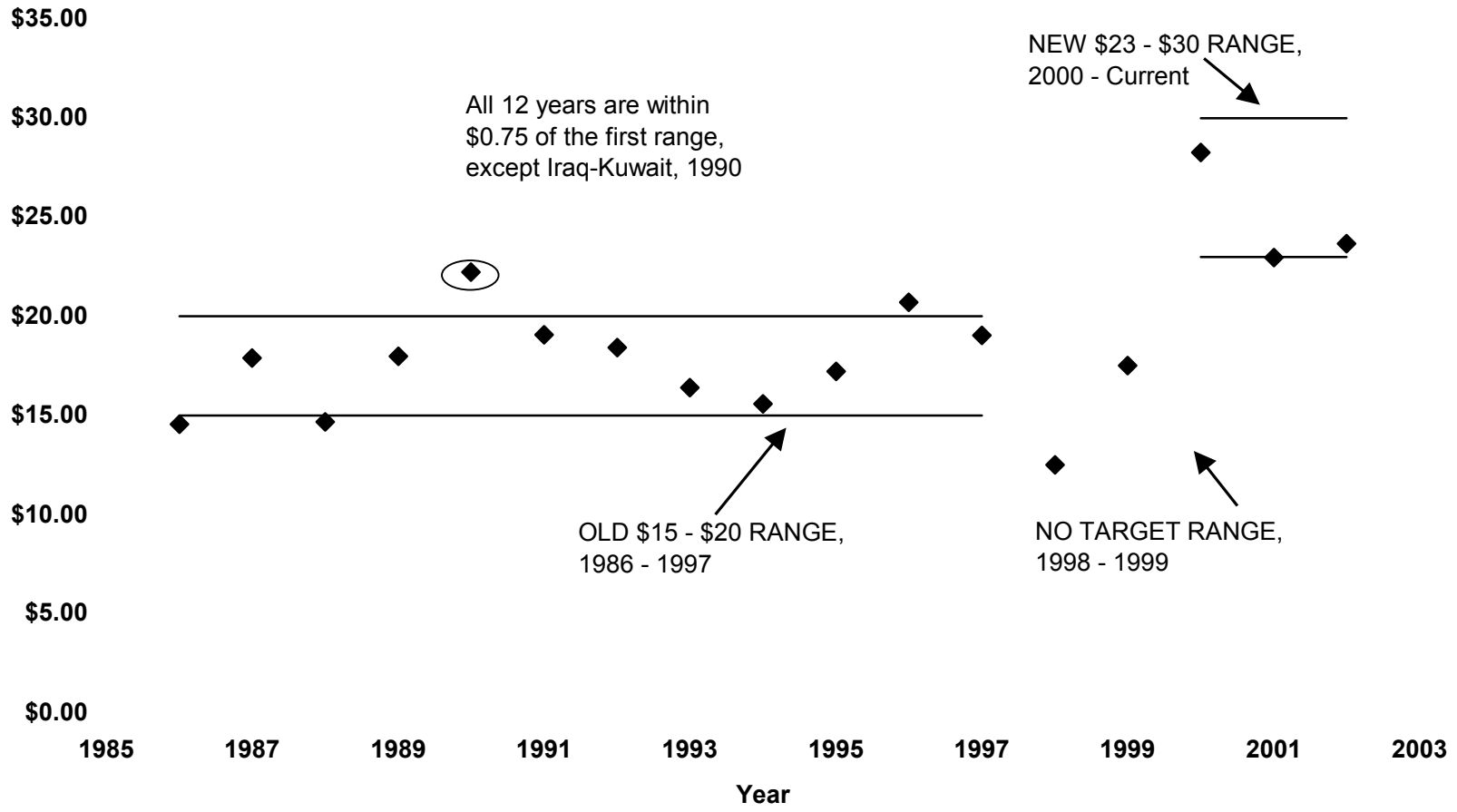
II. The Tradeoff: Price Stability and Military Security

American and European oil companies managed production in the Persian Gulf much the same way as in Texas or the North Sea. However, the 1973 Arab-Israeli war created a surge of antagonism in the Arab world against the U.S. and Europe. The OPEC nations, led by Saudi Arabia, seized the authority to control oil production within their countries. Their efforts to raise oil prices were initially successful, nearly reaching $40 per barrel, but had collapsed by 1986 with crude prices at $10 per barrel.

In 1986 then-Vice President George H. Bush went to the Persian Gulf and worked with the Saudi King and government to stabilize oil prices at a higher level. The price range framework which was created in 1986 is essentially the price structure which exists today: see Figure 3. All 12 years are within 75 cents of the first target range, except the 1990 price when Iraq invaded Kuwait. The new price range of $23-$30 was established in 2000; it is equivalent to the old $15-$20 range adjusted for inflation. The collapse of the old price range in 1998 was influenced by the economic recession in Asia in that year, the 300% increase (from 1996 to 1998) in Iraq's oil output, and the inflation-reduced value of revenues generated under the old price range. The most recent three years are all within the new range, as is the 2003 average to date. Persian Gulf production costs are $5 per barrel or less (see Table 12 below).

Why, then, do the Gulf countries not pursue a low-price policy which would increase their sales, market share, and perhaps their revenues? When prices are below $15, the normally slow rate of production decline in the U.S. falls more rapidly as high-cost facilities are shut down and drilling plummets. American oil producers' revenues are affected twice: first by reduced production, and second by a lower price. With very low prices, American oil companies will not encourage the U.S. government to support the existing Persian Gulf governments. At low oil prices, petroleum companies move to influence American policy to raise prices, as in 1986 and 1998.

Figure 3. Target Price Ranges: Old and New



In contrast, with very high oil prices, American consumers and oil-using businesses dominate American policy. Congressmen from states without oil production call for termination or reduction of military support for Persian Gulf governments. American policy considers withdrawing military and political support of the Gulf governments at either extreme of the price spectrum.[3]

The Gulf governments understand these reactions, and the potential threat to their security if prices are outside the target range. Table 3 summarizes several of the political, economic, and military factors which work to keep prices within the range, currently $23-$30. It is a system which economists describe as a Nash equilibrium.[4] Neither side can improve its overall situation by working to move crude prices outside the price range.

Iraq's invasions of the oil regions of Iran (1980) and Kuwait (1990), if successful, would have gained for Iraq control of nearly half of known oil reserves and a fourth of total remaining resources (see Table 9 below). Success in these two invasions would have led to an Iraq influence, control, or occupation of the remainder of the Gulf countries. In this case, Iraq would have held three-fourths of known global reserves and one-half of remaining oil.

III. Military Security, Nuclear Weapons, Al Qaeda

In reaction to these concerns, Persian Gulf governments undertook major military expansion in the 1990s. In one three-year period, three Gulf countries purchased $32 billion in weaponry (see Table 4). The total population in these three countries (Kuwait, Saudi Arabia, UAE) was about 25 million. In other words, these three countries expended more than $1,000 per capita on arms, 13% of their Gross Domestic Product.

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3 As noted above, when oil prices were very low, the goal of then-Vice President George H. Bush in his 1986 visit to Saudi Arabia was clearly to raise oil prices to protect American producers and their support for him (Yergin, pages 755-758). The role of Congressmen from oil consuming states was evident in 2000 in a period of high prices (e.g., *New York Times* March 2, 19, 23, & 29; 2000).

4 After the Nobel prize winner John Nash who pioneered game theory concepts.

Table 3: General Economic Impact of Crude Oil Price Decision–Making in a Game Theory Price Range Framework

Price per barrel	OECD Countries	Persian Gulf Oil Producers
$15 or less	• higher GNP growth • shut some domestic production • greatly increased oil consumption • much more imports • more pollution, climate change • end Persian Gulf political support by OECD oil industry	• loss of political support from OECD oil industry • lower revenue, greater volume • internal economic problems • faster depletion • higher market share
$23 - $30	• stable GNP growth • stable OECD oil production • slow growth in oil consumption • slow growth in import share • stable prices • ANWR production feasible • continued Persian Gulf support	• continued OECD political, military support • stable revenue, rent • stable market share • cooperation with OECD oil industry
$40	• decline in GNP growth • rapid near-term growth domestic production • stable or declining consumption • ANWR production profitable • OECD Persian Gulf support opposed by oil consumers	• loss of OECD political, military support • increased incentives for Central Asia, other non-OPEC production • less market share • less production, more profit, rent • greater payoff to successful Iraq-type action

Table 4. Value of Arms Transfer Deliveries by Major Supplier and Recipient Country
(Cumulative 1994-1996, millions of current dollars)

Supplier / Recipient	**Total**	**US**	**UK**	**Russia**	**France**	**Germ-any**	**China**	**Other NATO**	**Middle East**	**Other East Europe**	**Other West Europe**	**Other East Asia**	**All Others**
World	119,565	67,210	16,405	8,490	6,675	4,045	1,970	4,610	3,070	2,130	2,485	595	1,880
Developed	**52,070**	**38,760**	**1,355**	**845**	**2,160**	**3,025**	**40**	**1,990**	**1,310**	**180**	**1,370**	**200**	**835**
US	3,330	-	950	40	160	320	40	950	330	30	140	200	170
Israel	2,865	2,600	0	0	0	150	0	5	0	10	0	0	80
Russia	50	30	0	-	0	0	0	0	0	20	0	0	0
France	695	550	0	0	-	0	0	40	5	0	0	0	80
Germany	2,710	2,600	0	0	0	-	0	60	10	0	0	0	0
Japan	6,020	6,000	0	0	0	0	0	0	0	0	0	0	0
Developing	**67,495**	**28,450**	**15,050**	**7,645**	**4,515**	**1,020**	**1,930**	**2,620**	**1,760**	**1,950**	**1,115**	**395**	**1,045**
China	2,565	120	0	2,000	0	0	-	0	320	30	0	0	80
Taiwan	4,090	3,330	0	0	775	0	0	0	0	0	0	0	0
OPEC	**36,080**	**15,150**	**12,915**	**1,625**	**3,040**	**190**	**525**	**940**	**85**	**310**	**860**	**150**	**290**
Iran	1,025	0	0	320	0	0	500	10	10	80	10	50	5
Kuwait	3,405	1,900	675	750	60	0	0	0	0	20	0	0	0
Saudi Arabia	26,585	11,700	11,200	0	2,000	60	0	775	0	0	850	0	0
UAE	2,270	800	260	200	750	0	0	0	0	20	0	40	200
NATO	25,525	18,150	1,195	230	1,300	1,470	40	1,785	580	45	275	200	255

Source: Prepared by Neha Khanna; from Chapman and Khanna, 2001, *op. cit*.

The importance of military policy and prices was noted above first with respect to the price range framework, and then again in the context of Iraq's attempt to control Persian Gulf Oil. Table 5 shows another dimension of this relationship. There is a strong correlation between arms trade and petroleum trade. Weapons exporters are likely to import oil (R = .74),[5] and oil exporters are likely to import weapons (R = .70).

Nuclear weapons are increasing in countries near the Persian Gulf; see Table 6. There is no current threat to Gulf oil production or shipment with nuclear warheads as of this writing. The many conflicts in nearby countries have existed independently of Persian Gulf oil. However, nuclear weapons capability might at a future date be utilized by Israel, Pakistan, or India. Each could threaten Persian Gulf oil production or transport to encourage greater U.S. and European involvement in the Kashmir and Middle East conflicts. The small possibility of a fundamentalist government assuming power in Pakistan translates into an equally small but real possibility that Pakistan could employ a nuclear threat against Gulf countries, or shipping, or American naval vessels and bases in the Gulf.[6]

Since any civilian nuclear power program can be the basis for manufacturing nuclear weapons, Iran's nuclear power development creates the potential for future weapons capability.

It is well known that 17 of the 19 September 11, 2001 hijackers were born in Persian Gulf countries. In addition, 7 of the 9 apparently highest-ranking leaders of the Al Qaeda organization are from Saudi Arabia or its neighbors.[7] The May 2003 attacks against Westerners in Saudi Arabia were made primarily by Saudis. Bin Laden and Al Qaeda apparently see the governments of Saudi Arabia and the other southern Gulf nations as semi-colonial agents of the United States. In part, the Al Qaeda political program is focused on the goal of replacing the Persian Gulf monarchies because of their strong association with the U.S.[8]

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5 Tables 4, 5, and 6 were prepared by Neha Khanna and used earlier in D. Chapman and N. Khanna, "An Economic Analysis of Aspects of Petroleum and Military Security in the Persian Gulf," *Contemporary Economic Policy*, October 2001, 19(4): 371-381.

6 A point we made in Chapman and Khanna 2001, page 379.

7 Osama bin Laden, Khalid Shaikh Mohammed, Ramzi bin al-Shibh, Abd al-Rahim al-Nashiri, Walid Ba'Attash, Mustafah Muhammed Ahmad, and Mustafa Ahmed al-Hawsawi.

8 CNN March 1997 interview with Osama bin Laden, especially transcript pages 1, 2, and 5.

Table 5: Correlation Coefficients

Correlation of			Pearson's Correlation Coefficient
Arms exports	with	Oil imports	0.74
Arms imports	with	Oil exports	0.70
Total arms trade	with	Total trade	0.69
Total arms trade	with	Total oil trade	0.80
Total trade	with	Total oil trade	0.81

Variable definitions: All data are for 1995

Arms exports (imports): value of conventional weapons exports (imports)

Arms trade: sum of arms exports and arms imports

Oil imports (exports): total volume of crude oil and refined petroleum products imports (exports)

Total trade: total value of merchandise imports and exports

Source: Chapman and Khanna, 2001, *op. cit.*

Table 6: Nuclear Weapons Capabilities

Name and history	Arsenal (number of warheads)	Representative Missile Range (miles)
1. Countries with nuclear weapons capabilities		
United States First test: 1945 Total number of tests: 1,030	12,070	8,100
United Kingdom First test: 1952 Total number of tests: 45	380	7,500
France First test: 1961 Total number of tests: 210	500	3,300
Russia First test: between 1945-1952 Total number of tests: 715	22,500	6,800
China First test: 1964 Total number of tests: 45	450	6,800
India First test: 1974 Total number of tests: 6	65	1,500
Israel Known to have bomb	64-112	930
Pakistan Began secret program in 1972	15-25	930
North Korea	?	?
2. Countries that terminated nuclear weapons programs		
Algeria, Argentina, Brazil, Belarus, Kazakhstan, Ukraine, South Africa.		

Source: Chapman and Khanna 2001.

To date there is no indication of competent Al Qaeda interest in nuclear weapons, although a minor initiative was discovered and terminated.[9] It would seem a likely possibility that Al Qaeda or similar groups would seek to work with fundamentalist Islamic political groups to gain control or influence over Pakistani nuclear weapons.[10]

IV. Global Oil Resources and the Persian Gulf; U. S. Imports

Tables 7 and 8 show the concepts that are utilized in estimating world oil resources.[11] The total remaining resource estimate of 2.855 trillion barrels (in Table 8) is the sum of three components. "Known Reserves" (similar in meaning to "Proved Reserves") are relatively firm values used in developing near-term production plans. It is the minimum amount of crude oil that may be expected to be produced from a field or reservoir.

"Potential Reserve Expansion" is a best-guess estimate of future production at an existing site which exceeds the proved reserves figure. As geological techniques have improved, potential reserve expansion has become more important in petroleum resource planning. It is a probabilistic concept. For an existing field under production, remaining resources would be the sum of "Known Reserves" and "Potential Reserve Expansion."

"Undiscovered Resources" is a term used by the U.S. Geological Survey (USGS). It could be roughly translated "Approximate probability distribution estimates of oil resources in areas which have not been explored in detail." In general, it is a category which relies on extrapolation. Suppose Area A is a region that has been producing for many years and has been extensively investigated. Known reserves are set at 500 million barrels. Area B is the same size with apparently identical geology. The undiscovered resource for Area B may have a mean estimate of the same 500 million barrel figure, with a 95% probability of at least 400 million barrels, and a 5% probability of 600 million barrels.

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9 Jose Padilla is reported to have met with Al Qaeda members, and studied radiological weapons on the internet. *Baltimore Sun*, September 12, 2002; *Washington Post*, June 15, 2002.

10 *New York Times*, November 1 and December 17, 2001. Seymour Hersh, "Watching the Warheads," November 5, 2001 *New Yorker*, pages 48-54.

11 Tables 7-9 and Figure 4 build upon recent work by Chapman or Chapman and Khanna. That work, in turn, uses basic data from the U.S. Geological Survey.

Table 7. Concepts in Resource Definition

A. *Proved Reserves* –	Economically recoverable conventional crude oil at known fields and reservoirs, estimated directly by engineering as well as geological data. Similar to an inventory concept.
B. *Potential Reserve Expansion* –	Identified reserves expected to be developed in existing fields through improved recovery, extensions, revisions, and the addition of new reservoirs and pools.
C. *Undiscovered Resources* –	Geological extrapolation of potential crude oil based upon knowledge of geological formations outside existing fields. A probabilistic concept.
D. *Total Remaining Resources* –	An estimate of total conventional crude oil available for recovery; the sum of the preceding categories.
E. *Original Endowment* –	The amount of oil existing before production began in 1859. It combines the amount of cumulative production to date with the remaining resources estimate.

Sources: USGS, "1995 National Assessment of United States Oil and Gas Resources," USGPO 1995. D. Chapman, "World Oil: Hotelling Depletion or Accelerating Use?" *Nonrenewable Resources*, Journal of the International Association for Mathematical Geology, Winter 1993, 2(4).

Table 8. Probability 5% of Remaining World Oil Resources
(billion barrels)

Category	Amount
Known Reserves	883
Potential Reserve Expansion	682
Undiscovered Resources	1,290
Total Remaining Resources	2,855

Note: The 2000 Assessment data used a January 1, 1995 benchmark date. Production in the 8 years 1995-2002 was 192 billion barrels, implying a current remaining resource estimate of 2,663. World cumulative production 1859-2002 has been 931 billion barrels, implying an original endowment of 3.6 trillion barrels. The table is a revision of Table 1 in D. Chapman, "A Review of the New Undiscovered Conventional Crude Oil Resource Estimates and Their Economic and Environmental Implications," Cornell AEM Working Paper 2001-22, December 2001.

These assessments are developed for individual regions throughout the world. A real example for Russia: in Western Siberia, the Togur-Tyumen Petroleum System has 5 fields. The 95% probability estimate is 2.3 billion barrels, and the 5% probability estimate is 14.7 billion barrels. For all of Russia, the USGS analyzed 45 assessment units with 331 oil fields. The results: 95% probability of 25 billion barrels, and a 5% probability of at least 148 billion barrels; this, recall, in the "Undiscovered Resource" category.

Figure 4[12] shows the changing nature of the probability distributions for "Original Resources," the 5th category in Table 7. At every probability level, the estimates have increased. For the latest assessment, the range between high probability low resource estimates and low probability high oil resource estimates has increased. For the 5% probability level, the estimate of original endowment has grown by 1.5 Tbl (trillion barrels). Petroleum resources in the Persian Gulf are shown in Table 9.[13] (The terminology in Table 9 uses the concepts explained in the discussion of Tables 7 and 8.) The dominant position of the Persian Gulf countries is evident. The region holds 76% of known reserves and 54% of estimated total remaining resources.

Since Persian Gulf oil costs are on the order of $5 per barrel, and U.S. and European costs are on the order of $20 to $25 for new fields,[14] the importance of the Gulf region in quantity of resources is multiplied by its uniquely low production costs.

In the long run these factors will increase in importance. The U.S. including Alaska is past its production peak, and production levels in the U.S. will continue to decline. North Sea production is probably at its maximum. In contrast, the Persian Gulf has produced a much smaller proportion of its original endowment than has the U.S.: 11% versus 38%. As American and world oil consumption continues to grow, the role of the Persian Gulf countries will continue to increase in importance, in both quantity and value.

A closer look at the U.S. (Tables 10 and 11) illuminates the global importance of the Persian Gulf. U.S. imports are growing rapidly: nearly 4% annually. Two primary factors create

12 Figure 4 is from Chapman 2001, *op. cit.*

13 The 5% high resource estimates are used in Table 9 because the author assumes (a) the Figure 4 probability distributions will continue shifting rightward for some time, and (b) at some future date the real price of oil will pass $50, creating new incentive for increased recovery.

14 See discussion of costs below, and Table 12.

Figure 4. Change in Probability Distribution of Original Resource Endowment Estimates

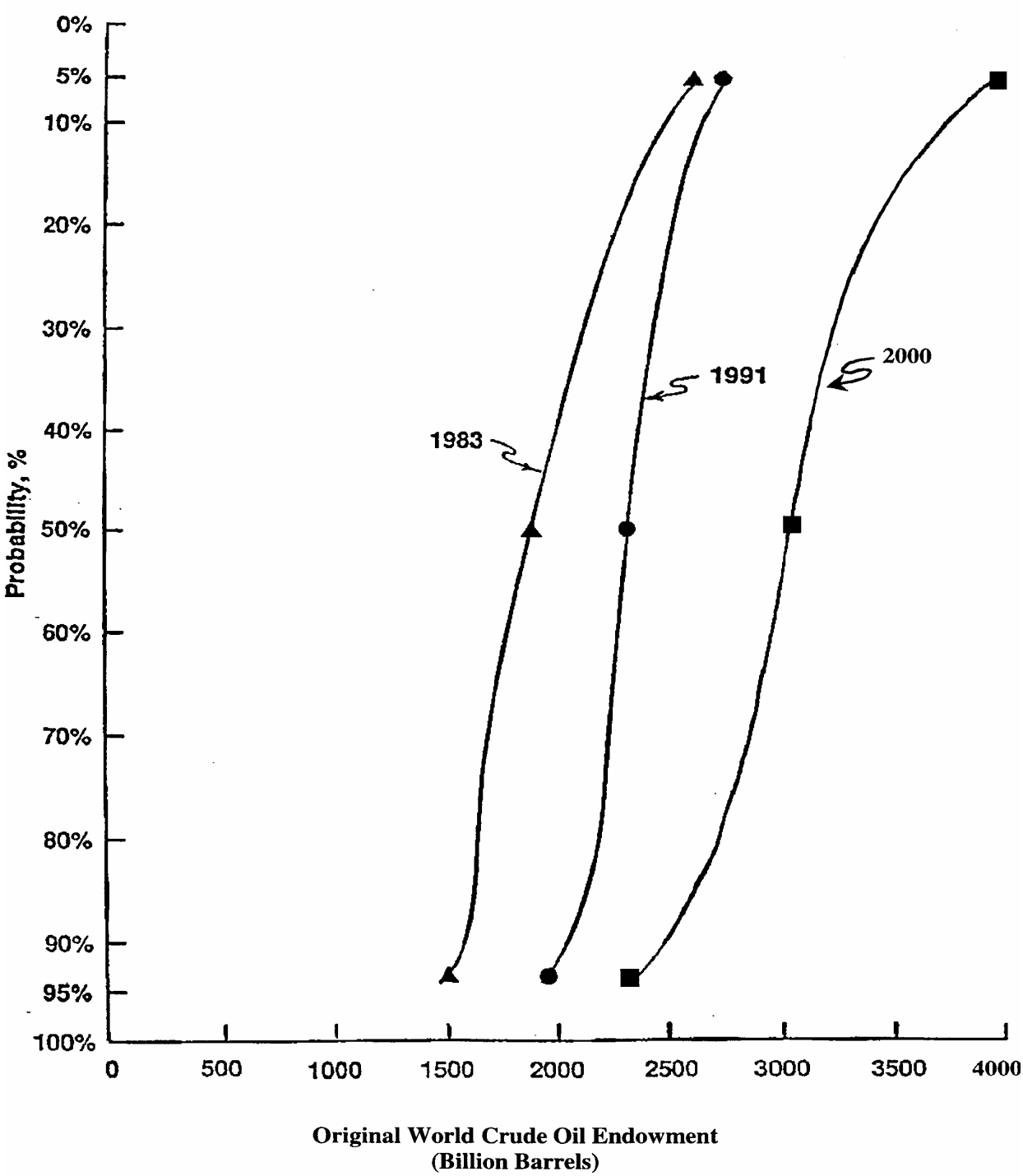

Table 9. Persian Gulf, 2000 Assessment, billion barrels

Country	Cum. Prod.	Known Reserves	Reserve Exp.	Undis. Resources	Original Endow.	Rem. Resource	RR % World
Bahrain	0.9	1.1	0.8	1.7	4.5	3.6	0%
Iran	33.7	105.0	74.8	100.5	314.0	280.3	10%
Iraq	22.4	100.1	71.3	83.9	277.7	255.6	9%
Kuwait & NZ	31.0	93.6	66.6	7.2	198.4	167.4	6%
Oman	3.6	7.3	5.2	7.3	23.4	19.8	1%
Qatar	5.0	9.2	6.6	6.4	27.2	22.2	1%
Saudi Arabia	72.8	283.5	201.9	160.9	719.1	646.3	23%
UAE	15.7	72.9	51.9	15.5	156.0	140.3	5%
Total Persian Gulf	185.1	672.7	479.0	383.4	1,720.2	1,535.1	54%
% World	26%	76%	70%	30%	40%	54%	
World	**708**	**883**	**682**	**1,290**	**3,563**	**2,855**	**100%**
Row	539	859	612	1,107	3,117	2,578	90%
U.S.	169	24	70	183	446	277	10%

Notes to Table 9

1. Reserve expansion in Persian Gulf extrapolated from ratio of total Rest of World Expansion (612) to Known Reserves (859), or .712.
2. Suppose reserve expansion in Persian Gulf extrapolated as 94.3% of mean undiscovered: 612/649 from FIG AR-5 in Assessment 2000. Association of Reserve Expansion with Undiscovered Resources is obvious. Reserve Expansion= 193.1, instead of 479.0 in table.
3. Some rows and columns do not add exactly because of rounding.
4. Iraq's goals in the last 25 years: Iran, Kuwait, and Saudi Arabia. These four constitute 66% of known reserves, 61% of reserve expansion, and 47% remaining resources; worldwide.
5. Current consumption per year: World, 24/25 Bbl.; U.S, 7 Bbl.; U.S. production: 2.1 Bbl. Imports, 3.4B crude, .8B refined, .7B NGL.
6. "Rem. Resources" means remaining resources, the sum of the second, third, and fourth columns: "Known Reserves", "Reserve Expansion", and "Undiscovered Resources".

Sources: USGS, "World Petroleum Assessment 2000 – Description and Results," 2000, website www.usgs.gov., USGS, "National Assessment," *op. cit.*, U. S. Minerals Management Service, "Outer Continental Shelf Petroleum Assessment," 2000, website www.mms.gov.

Table 10. Basic U.S. Petroleum Data (billion barrels)

	1995	2002	Annual Changes
Consumption	6.47	7.21	+2.2%
Exports	.35	.36	+0.6%
Imports	3.22	4.21	+5.5%
Domestic Production Total	3.15	2.94	-1.4%
Alaska	.54	.36	-7.8%
Lower 48	1.85	1.74	-1.2%
Natural Gas Liquids; Other	.76	.84	+2.0%

Notes: Each entry includes both crude oil and petroleum products. Source is *Monthly Energy* Review, October 2003.

Table 11. U.S. Petroleum Imports, Major Sources, 2002

	kbl/d	Mbl/y	% U. S. Total
*Saudi Arabia	1,553	567	14%
*Iraq	442	161	4%
*Other Persian Gulf	259	95	2%
*Total Persian Gulf	2,254	823	20%
Canada	1,939	708	17%
Mexico	1,532	559	13%
*Venezuela	1,383	505	12%
*Nigeria	596	218	5%
UK	477	174	4%
Norway	379	138	3%
*Angola	326	119	3%
*Algeria	269	98	2%
*Colombia	256	93	2%
Russia	202	74	2%
Other 15 Countries	1,745	637	15%
Total 33 Countries	**11,358**	**4,146**	**100%**

Notes: imports are overwhelmingly crude oil rather than products or natural gas liquids. Asterisk denotes author's judgement of existence of severe current or potential internal conflicts. "Mbl" and "kbl" mean million barrels and thousand barrels. Percentages do not add to 100% because of rounding error. Source: *Monthly Energy Review*, May 2003.

this result. First, American consumption continues to grow, and is now about 7 billion barrels per year.[15] Second, production continues to fall in Alaska and in the lower 48 states.

Imports (less exports) must continue to grow, even in the hypothetical event of stabilized U.S. consumption. Oil production in the Alaskan National Wildlife Refuge would be costly in both economic and environmental terms, but would only slow (not reverse) this trend of growing imports. The current U.S. imports come from four continents. China is the only major oil producer which does not export petroleum to the U.S.; China is also a net importer. Table 11 shows the 13 leading sources of U.S. petroleum imports. Eight of the 13 areas are now involved in war or major internal conflict. The Appendix A lists all of the companies importing crude oil into the U.S. in 2002, with their total imports and imports from the Persian Gulf. Given the broad corporate network which handles world trade in crude and products, major production losses in any one exporting country do not necessarily cause significant supply problems for importing countries. (British Petroleum, owner of 80% of Prudhoe Bay production, is not considered a major importer because it produces U.S. oil for use in the U.S.)

V. The $60 Trillion Prize

Persian Gulf oil is the lowest cost petroleum in the world. It is less than $5 per barrel.[16] These cost figures in Table 12 include exploration, capital investment, a return on capital, and a risk allowance. Throughout the Persian Gulf every dollar above $5 is a dollar of additional profit. If the price is $45 the additional profit above a normal profit is $40.[17]
Assume that $40 per barrel represents the profit from Persian Gulf crude oil over the remainder of the century. This gives an indicative figure of the value of remaining resources in the Persian

15 We use 26% of world consumption, a percentage which has not changed in 20 years. U.S. and world consumption have grown at the same rate.

16 Based on data in the *Financial Times*, February 21, 2003 (page 3), the comparable cost for Iraq is $2.40 per barrel before shipping.

17 In economic terminology, this is considered to be either producer surplus, or economic rent.

Table 12. Illustrative Production Cost

	Possible Low Persian Gulf Cost	**Possible North Sea Cost**
Investment in Development, amortized (including profit)	55¢	$10
Operations, lifting	25¢	$5
Shipping	$2.00	included in operations
Total (rounded)	$3.00	$15

Source: Chapman and Khanna (2000) and Chapman (1993).

Gulf: $61 trillion.[18] It is a result of multiplying the remaining resource estimates in Table 9 by $40. Because production costs are so low in the Gulf, the Table 13 values are almost wholly producer surplus.

This, then, is the global problem: $61 trillion in oil wealth, in an area with 120 million people. In general terms, this is a serious world concern. The $61 trillion has been an attraction to Western oil companies and governments. It was the goal of the Iraq invasions of Kuwait and Iran. For the governments of the Gulf, recognition of the threats to their stability led to their acquisition of considerable weaponry in the 1990s, and their alliance with the United States. At the same time, the continuation of monarchies and dictatorships has been associated with the growth of Al Qaeda, and the armed attacks against the U.S. on September 11, 2001 in the U.S., and elsewhere.

The problems of production and price stability have been solved in a reasonable economic framework. However, political instability, the spread of nuclear and conventional weapons, and the growing ferocity of the military conflicts and terrorist activities in, or originating in the region show us that a breakdown of civil authority will lead to a collapse of the economic framework of Persian Gulf oil exports. There are three broadly different approaches to the problem.

VI. Roads to the Future

The three broad roads of choice have already seen heavy use. I describe them as the "hands off" (or autonomy) approach, the American security framework, and an international framework.

A. Autonomy: "Hands Off"

Autonomy suggests self-government and sovereignty for each individual country. It implies that other nations do not seek to dominate the region; or, if they seek to do so, they are unsuccessful. The years 1973-1990 roughly approximate this picture.

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18 Discounting of course gives different values. In one optimal control analysis where rising demand curves intersect a sequence of supply curves under a fixed constraint of remaining world oil of 3 trillion barrels, the discounted values are of course smaller than the Table 13 figures. See Chapman, December 2001, *op. cit*.

Table 13. Persian Gulf Petroleum Wealth

(trillion dollars)

Method	Iraq	Saudi Arabia	Eight Persian Gulf Nations
A. $40 per barrel Undiscounted profit	$10 T	$26 T	$61 T
B. Discounted supply demand equilibria	$2 T	$5 T	$12 T

Notes: "T" means trillion dollars. For comparison, total world GDP was estimated to be $31 T in 2001, by the World Bank. $40 barrel profit represents $45 average future price less $5 cost. For method B, see footnote 18.

In petroleum management, the Gulf nations and OPEC sought to organize world oil

prices and production from 1973 (the "Oil Embargo") to 1986 (Table 2). For most of this period the West reacted to OPEC initiatives by developing alternative but high-cost oil supplies in Alaska and the North Sea. Mexico and Russia became major exporters. These two developments (OECD oil in the North Sea and Alaska, the emergence of major exports from Mexico and Russia) unraveled OPEC's hopes to control prices. In 1986 then-Vice President George H. Bush organized the OECD/OPEC price framework (Figure 3, Table 3) which continues to the present.

Persian Gulf governments more or less pursued their own destiny as they saw it during this period. Iran replaced its monarchy, which had itself been reintroduced with the active support of the US-CIA. Iraq (with minor support from the US-CIA) changed its government from a military dictatorship supported by communists, to a Baath party dictatorship (Table 1). Iraq invaded Iran. The U.S. sold arms to Iran in the Iran-Contra program, and provided limited support to Iraq in its war with Iran. The other Gulf states continued as oil exporters under independent monarchies dominated by leading families, without major civil disturbances.

The severe defect in this approach was made evident by Iraq. As we saw above (Table 9), Iraq sought control of Persian Gulf oil. It saw a $60 trillion prize, and fought to seize it through war. The Iraq-Iran war dead are thought to be one million; Iraq's invasion of Kuwait and the first Gulf War to remove Iraq from Kuwait added perhaps another 100,000 dead. All together, the first two Iraqi wars killed a million combatants and civilians, more or less. National borders and world oil markets remained essentially unchanged.

Any global policy which leaves Persian Gulf nations undefended invites future aggression from within or without the region, with the goal of that aggression to seize and hold oil wealth. Of course aggression by Iraq is not today a threat to global stability. But the prize remains, and the nuclear and conventional weaponry in the region continue to expand.

Those future aggressions are not visible today. Would a regional power (Turkey, Israel, Pakistan, India?) seek to appropriate a share of petroleum wealth? Could Russia revive its old goals of power and influence in Iran and Iraq? Is it possible that at some future date one or more Western nations could make an effort to secure a share of the Gulf's oil? Another of the Gulf states?

If the Persian Gulf were to experience a return to the international laissez faire conditions of 1973-1990, the only certainty is that new efforts will be made to lay hold of the oil. These

new efforts would involve the increasingly destructive power of conventional weaponry, and a possibility of use of the growing arsenal of nuclear weapons.

This, then, is the powerful force which leads to the need for a Persian Gulf security framework. Consideration of equity and practicality leads to several desirable characteristics of a security system:

1. Stable oil production and the continuation of a price range mutually acceptable to OECD consumers and Gulf exporters.
2. A level of revenues sufficient for Persian Gulf governments.
3. Sufficient military power to deter wars of expropriation of Gulf oil.
4. Political or military mechanisms to reduce the growing nuclear threat in the region.
5. Institutional protection against control of oil by the providers of military security.
6. Governments in the Gulf which are supported by their citizens.

B. An American Security Framework

Can the United States provide the necessary security? The United States has significant assets which support an affirmative position on the issue. Most importantly, the U.S. has demonstrated military strength which is clearly adequate to deter or defeat any Persian Gulf nation or regional power which might consider the pursuit of Gulf oil.

On two other conditions, an American framework would be satisfactory for the foreseeable future. The target price range with stable world supply is continuing as the occupation of Iraq evolves. In addition, revenues to Persian Gulf governments continue at levels acceptable to them.

The implications of the other three conditions are less supportive of a unilateral American security structure. India and Pakistan may feel that with America's attention focused on the Persian Gulf, they each might consider expanding their nuclear arsenals without provoking a strong negative reaction from the U.S. For Iran, the presence of American armed forces on 10 of its borders is of strong concern. The acquisition of nuclear weapons will appeal to some in Iran's leadership as a means to deter possible U.S. invasion.

For Russia, China, and perhaps France, the maintenance or expansion of nuclear weapons capability will seem a potential counterweight to growing American power. Overall, an American security framework in the Persian Gulf is likely to expand rather than reduce nuclear

weapons capabilities, regionally and globally.

The implications of the fifth condition – protection against control of Persian Gulf oil by the providers of military security – are perhaps impossible to evaluate today. The next few months of the American occupation will give some insight into future management of Iraqi oil by the U.S.

The last condition of popular support for Persian Gulf governments is particularly challenging. If the American goal is the protection of stable global oil markets at reasonable prices, then there is logical motivation to endeavor to encourage the democratization of governments in the Gulf. Non-economic goals may constitute a second motivation which leads the U.S. on a quest for democratization throughout the region.

A still different outcome might be that democracy and elections in some Gulf countries could bring to power governments fundamentally opposed to the U.S. As outlined above, Al Qaeda's political support is based upon its fervent opposition to Gulf monarchies, American influence, and secularism. An American security system linked to a continuation of the monarchies would seem to accelerate popular support for Al Qaeda-type policies and actions.

C. An International Security Framework

An international approach would have some potential advantages. Given the success to date with the current price range system (see Section II above), an international approach ought to be able to manage stable oil production and prices, and sufficient revenues for Gulf governments. With participation from the U.S. and others, it would be able to deter wars of appropriation of Gulf oil. As an international group, it would be well placed to forestall control of the region's oil by security providers in the international organization. If an international framework is satisfactory on these points, then the motivation for nuclear weapons in the region is reduced.

The last requirement seems most problematic: how would an international organization lead to increased democratization and governments which have a greater degree of popular support by their citizens? Would more democratic governments and elections need to be imposed upon the region? Would this, in turn, lead to greatly reduced incentives for Al Qaeda-type organizations? Or would the opposite occur with greater public participation, would there be a growth in hostility towards the U.S. and increased terrorism?

The elephant in this concept, certainly, is the nonexistence of any organization of the type hypothesized. Any important and successful international structure must have the U.S. playing a leadership role, and that generality applies here. American participation must be significant both militarily and organizationally. The military dimension is perceivable as something roughly patterned after NATO. As with NATO, a Persian Gulf Organization would include major military powers, and also nations that see themselves as in need of military protection. As with NATO, the organization would incorporate former enemies. Just as NATO now includes Poland and Germany, Greece and Turkey, a Gulf organization would incorporate Iraq, Kuwait, Iran, Saudi Arabia, and the other Gulf states.

There are also partial parallels here with the World Trade Organization, the European Union, OPEC, the 1991 Persian Gulf Coalition, the Gulf Cooperation Council, and the UN Security Council as well as with NATO.

Use "PGO" to suggest a Persian Gulf Organization or Authority. Potential participants would be the 8 Persian Gulf States, the U.S., the U.K., China, France, Japan, Germany, Russia, and perhaps members from Africa, Latin America, and the Middle East. It might be financed by a tax on oil exported from the Gulf. Such revenues (both tax revenue and revenue from export oil sales) could be allocated to Gulf states, and also utilized to support the military forces employed to protect and stabilize the Persian Gulf.

Consider a current price of $30 per barrel at a tanker loading facility in the Gulf. This is at the high end of the existing price range framework. The revenues might be distributed as suggested in Table 14, with a total illustrative figure of $180 billion as annual revenue associated with the current Gulf export level of 6 billion barrels. The $30 figure could be seen as the current (June 2003) $25 price for Saudi oil, plus an additional $5 tax.

The first item in part B of the Table provides for the costs of production, development, risk, and profit. The $5 figure is higher than the $3 estimate in Table 12. Iran may be at or above a $5 cost; Iraq and Saudi Arabia may be lower. General inflation will work to increase this amount, while continuing technological innovation will work to lower production cost.

Table 14. Hypothetical Illustration of Allocation of Persian Gulf Revenue by a Persian Gulf Organization or Authority.

A. Assume: 6 Billion Barrels Exported @ $30 per Barrel. Revenue Equals $180 Billion Annually.

B. Illustration of Revenue Allocation

#1. $30 B to oil production, development, profit ($5 per barrel).

#2. $90 B as revenue to Persian Gulf States ($15 per barrel).

#3. $60 B as support for military expense ($10 per barrel).

Ultimately, in some future decade, depletion will cause an increase in cost. But now and for the next few years $5 is a reasonable approximation of cost (including a return to capital) for the region.

Second: $90 billion as revenue to Persian Gulf states. This may be equal to or slightly less than existing regional expenditures on civilian government functions. One consequence of an effective PGO-type entity would be major reductions on military costs incurred by Gulf states, establishing a much higher proportion of petroleum revenues available for nonmilitary and security purposes.

Third: $60 billion available each year as financial support to the providers of Persian Gulf security. This ought to approximate U.S. annual military expenditures for Persian Gulf security during the non-war years 1992 to September 2001.[19]

The current unilateral U.S. security system inherently manifests what economists call the "Free Rider Problem"[20]. The major consumers of Persian Gulf oil are Europe, Japan, South Korea, Taiwan, and the Philippines (Table B2 in Appendix B). As long as the U.S. (and to a lesser extent the U.K.) manage security, there is no incentive for these countries that consume Persian Gulf oil to participate financially in security measures.

Similarly, the political and human cost is borne by the U.S. and Persian Gulf states, and not those regions that actually depend upon and use Persian Gulf oil.

The unilateral approach suffers from a serious political defect. The U.S. will experience considerable difficulty in attaining legitimacy as the sole governing authority in Iraq and possibly in other Gulf states. In contrast, a multilateral system would have lesser problems with legitimacy, internationally and in the Gulf region itself.

The conditions outlined on page 29 seem to be best met by a multilateral approach. However, any multilateral or international security structure in the Persian Gulf must have the U.S. as a leader and supporter, militarily and politically. The international political difficulties surrounding the issues of Iraqi weapons, inspection, disarmament, and occupation all indicate the problems to be encountered in establishing an international system. There is no certainty that an

19 In 1992, Darwin Hall estimated the incremental cost of Persian Gulf military expenditures for the U.S. to be $10 per barrel (adjusted to 1995 prices); D. Hall, November 1992 *Energy Policy*, 20(11) 1089-1096. In the mid '90s, Michael O'Hanlon estimated the military cost to the U.S. for Persian Gulf security to be $50 billion annually (*New York Times* December 30,1995, and September 18, 1996). Also see Chapman and Khanna 2000, page 7.

20 A point suggested by Richard Fullerton.

international structure is feasible with U.S. leadership; it cannot be considered without U.S. leadership.

Appendix A. Company Network Importing Oil into the U.S., Total and Persian Gulf

January - December 2002
(Thousands of Barrels)

Totals:	**3,302,012**	**802,891**	**24%**
Company	**Total**	**Persian Gulf**	**%Persian Gulf**
Chevron Corp	264,555	133,243	50%
Motiva Enterprises LLC	246,619	203,527	83%
Phillips 66 Co	233,958	24,842	11%
Exxon Co USA	219,197	70,758	32%
Mobil Oil Corp	201,803	9,204	5%
Sunoco Inc	198,113	2,428	1%
Valero Mktg & Supply Co	195,576	120,088	61%
Marathon Ashland Petro LLC	170,267	77,313	45%
Amoco Oil Co	156,733	32,861	21%
Flint Hills Resources LP	138,454	7,898	6%
Citgo Petro Corp	130,634	13,421	10%
Shell Oil Co	110,102		
Conoco Inc	95,155	617	1%
Lyondell Citgo Refg LP	89,117	9,525	11%
Phillips Petro Co	85,454	14,564	17%
Port Arthur Coker Co	61,243	2,969	5%
Company	**Total**	**Persian Gulf**	**%Persian Gulf**
BP Oil Supply Co	52,970	2,260	4%

Atofina Petrochemicals Inc	46,018	19,009	41%
The Premcor Refg Group Inc	44,039	6,313	14%
Orion Rfng Corp	44,007	1,447	3%
El Paso Merchant Energy-Petro	42,490		
Arco Prod Co	38,080	6,095	16%
Murphy Oil USA Inc	36,810	7,012	19%
Chalmette Refg LLC	32,387		
Tesoro Petro Corp	30,311		
Citgo Asph Refg Co	23,978		
PDV Midwest Refg LLC	23,794	517	2%
Equiva Tradg Co	21,383		
United Refg Co	21,286		
Tesoro Hawaii Corp	19,233		
Williams Refg & Mktg LLC	18,628		
Cenex Harvest States Coop	16,827		
Shell Chem LP	16,766		
Diamond Shamrock Refg & Mktg	15,522	2,415	16%
Lion Oil Co	12,508	12,508	100%
Shell US Tradg Co	12,161		
Crown Central Petro Corp	11,774		
Ultramar Inc	11,249	632	6%

Company	Total	Persian Gulf	%Persian Gulf
Hunt Crude Oil Supply Co	10,627	5,370	51%
Sinclair Oil Corp	10,460		
TPI Petro Inc	9,805	7,515	77%
Giant Yorktown Inc	9,007		
Fina Oil & Chem Co	8,882	4,039	45%
Frontier Oil & Refg	8,438		
Ergon Refg Inc	6,638		
Strategic Petro Reserve	5,767		
Koch Supply & Trading Co	5,656	1,039	18%
Trigeant Ltd	5,421		
Vitol S A Inc	4,667		
Shell Oil Prodts US	4,499		
Bayoil USA Inc	3,462	3,462	100%
Edgington Oil Co	3,235		
Farmland Indus Inc Cra	2,553		
Montana Refg Co	2,183		
Nexen Mktg	1,903		
Flying Petro Inc	1,653		
Statoil Mktg & Trdg (US) Inc	1,096		
Morgan Stanley Capital Grp Inc	1,074		
Husky Trdg Co	1,004		
NCRA	971		
Atlantic Trdg & Mktg Inc	948		

Company	Total	Persian Gulf	%Persian Gulf
Equilon Enterprises LLC	882		
Cannat Energy Inc	664		
Hess Energy Trading Co LLC	548		
Marquest Ltd Ptnrshp	406		
Equistar Chemicals LP	252		
Texaco Refg & Mktg Inc	110		

*Notes: Several factors influence the source of a company's crude oil imports. For example, a company like Motiva, which is partly owned by Saudi Refining Inc., would be expected to import a large percentage from the Persian Gulf, while Citgo Petroleum Corporation, which is owned by the Venezuelan state oil company, would not be expected to import a large percentage from the Persian Gulf, since most of their imports likely come from Venezuela. In addition, other factors that influence a specific company's sources of crude oil imports would include the characteristics of various crude oils as well as a company's economic needs. While, in general, crude oil is fungible, i.e., one crude oil can be substituted for another, many refineries are optimized by refining crude oil with specific qualities (e.g., the API gravity, the amount of sulfur in the crude oil, etc.). Also, depending on the global crude oil market condition at the time, the price difference between heavy and light crude oils varies, thus changing the economic dynamics for different refineries. Therefore, many factors determine the source of a company's crude oil imports. The data are based upon operating companies; consequently Chevron and Texaco are separate entries; and so are Exxon and Mobil; and BP, Amoco, and Arco.

Source: Reproduced from Energy Information Association, *Crude Oil Imports From the Persian Gulf 2002*; www.eia.doe.gov/pub/oil_gas/petroleum/data_publications/company_level_imports/current/summary2002.html>. Accessed May 3, 2003.

Appendix B. Additional Data on International Trade in Petroleum

Table B1. U.S. International Oil Trade

(billion barrels, 1999)

Crude Oil Exports To:		Crude Oil Imports From:
.01	to Japan	.77 from Middle East
.04	to Philippines	.55 from Canada
.01	to Australia	1.48 from Latin America
.07	to Europe	.02 from China
.16	to Latin America	.63 from Africa
.07	to Canada	* from Russia
.36	Total	.09 from Pacific
		.23 from Europe
		3.80 Total

U.S. Crude Production	2.4
Crude Oil Imports	3.8
Refined Product Imports	.8
Products from Natural Gas	.7
Total U.S. Supply	7.4

U.S. Consumption	7.0
U.S. Exports	.4
Total U.S. Disposition	7.4

Note: "" means less than .005.

Table B2. Middle East Exports

To --- Area	Amount
U.S	.77
Europe	1.69
Japan	1.54
Philippines/Taiwan/Asia	2.27
Australia	.06
Latin America	.21
Africa	.24
Other (Canada, other)	.05
Total	**6.83**

**Note: Persian Gulf production is 85.5% of Middle East production. Data for 2001, from MER January 2003.*

Table B3. Japanese Oil Consumption and Imports
(billion barrels and percents)

A. Imports: Amounts, and Percent of Consumption

Middle East	1.54	75%
Indonesia/Pacific	.31	15%
China	.06	3%
Latin America	.02	1%
Africa	.01	*
U.S.	.01	*
Europe	*	*
Russia	*	*

B. Japan Production, Percent of Consumption

	.005	*

C. Japanese Consumption	2.04	100%

**Notes: "*" means less than .005 Bbl/y, or less than one-half of 1%. Data for 1999. Sources are IPE 2000 and MER January 2003. Consumption exceeds production plus imports by .07; probably due to rounding, and different sources.*

Table B4. Western Europe: Trade in Oil
(billion barrels)

EXPORTS TO:		**IMPORTS FROM:**	
U.S.	.23	Middle East	1.69
Canada	.13	Africa	1.01
Russia	.08	Russia	.69
Africa	.06	Latin America	.17
Japan	*	U.S.	.07
Philippines/Asia	.02	Canada	*
Latin America	.02	Total	3.63
Total	.53		
CONSUMPTION:	5.54	PRODUCTION:	2.31
Total Consumption and Exports:	**6.07**	**Total Production and Imports:**	**5.94**

Table B5. Global Oil Trade, 1999
(billion barrels)

Produced and Consumed in Country of Origin:	10	42%
Traded in World Markets:	14	58%
Total Production/ Consumption:	24	100%

Sources: IPE 2000, MER January 2003

Table B6. World Leading Oil Producers

Country	Rank	Bbl/y
Saudi Arabia	1	2.8
Russia	2	2.7
U.S.	3	2.1
China	4	1.2
Mexico	5	1.2
Norway	6	1.1
Venezuela	7	.9
UK	8	.8
UAE	9	.7
Nigeria	10	.7
Kuwait	11	.7
Indonesia	12	.4
Total		15.3

**Note: Neutral zone production split 50-50 between Kuwait and Saudi Arabia. These are countries with at least one million bl/d production in 2002. Total World Production was 24.4 Bbl.*

Table B7. Population, GDP, Oil Production and Revenue

Country	*GDP per capita 2001*	*Population (millions) 2001*	*GDP ($billions) 2001*	*Oil Production Bbl 2001*	*Revenue @ $25/bl*
Bahrain	$9,370	0.7	6.2	0.1	$3B
Iran	$1,750	64.7	112.9	1.4	$35B
Iraq	$1,861	23.8	44.3	0.9	$23B
Kuwait	$18,030	2.0	35.8	0.7	$18B
Oman	$6,091	2.5	15.2	0.3	$8B
Qatar	$18,000	0.6	10.8	0.3	$8B
Saudi Arabia	$7,230	21.4	149.9	2.9	$73B
UAE	$18,000	3.0	54.1	0.8	$20B
		118.7	**429.9**	**7.4**	**$188B**

**Notes: The average per capita income: $3,600. The Oil Revenue as a % of GDP: 43.7%. For Iraq and Oman, GDP is estimated (very roughly) as the product (a) population, and (b) the midpoint of the per capita GNI range reported for each country by the World Bank. For Qatar and UAE, per capita is taken to be equivalent to that of Kuwait, $18,030 per capita.*