U.S. MILITARY EXPENDITURES TO PROTECT THE USE OF PERSIAN-GULF OIL FOR MOTOR VEHICLES


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15. U.S. MILITARY EXPENDITURES TO PROTECT THE USE OF PERSIAN-GULF OIL FOR MOTOR VEHICLES

15.1 UNITED STATES SECURITY AND PERSIAN-GULF OIL

In this Report, we seek to answer the question: “If the U.S. highway transportation sector did not use oil, how much would the U.S. Federal government reduce its military commitment in the Persian Gulf?” The analysis goes in four parts.

First, we explain that the U.S. protects its “oil interests” in the Persian Gulf primarily to prevent supply disruptions and sudden price rises and the attendant macroeconomic problems. We cite evidence (including statements by the Joint Chiefs of Staff) that the U.S. Congress and the military do indeed plan and budget military operations for the Persian Gulf on account of U.S. oil interests there. We review and rebut arguments that the U.S. has other interests in the region substantially more important than those related to oil.

Second, we review the best available estimates of the amount of that the U.S. military spends to protect U.S. interests in the Persian Gulf. As part of the review we address the difficult questions of how to allocate joint costs to particular programs.

Third, we consider whether any of the economic assistance granted to countries of the Middle East is related to U.S. oil interests in the region. We show that most of this assistance goes to Israel and Egypt, and probably is not motivated by a desire to protect U.S. oil interests in nearby Arab countries.

Finally, we work from our estimate of the cost of defending all U.S. interests in the Persian Gulf towards an estimate of the military cost of using oil in highway transportation. This proceeds in several steps: i) estimate how much military expenditure would be foregone if there were no oil in the Persian Gulf region; ii) estimate how much would be foregone if the U.S. did not produce or consume oil from the Persian Gulf, but other countries still did; iii) estimate how much would be foregone if U.S. producers had investments in the Gulf, but the U.S. did not consume Persian Gulf oil; iv) and lastly, estimate how much would be foregone if motor vehicles in the U.S. did not use oil, but other sectors still did and the U.S. (and other countries) still produced and consumed oil from the Gulf. This last is the bottom line of our analysis. Our analysis of these steps generally is illustrative, not rigorously quantitative. In the end, we estimate that if U.S. motor vehicles did not use petroleum, the U.S. would reduce its defense expenditures in the long run by roughly $1 to 10 billion dollars per year.

15.1.1 Why does the U.S. want to “protect” U.S. oil interests in the Persian gulf?

Oil is the major source of energy for every industrialized economy in the world. As a result, the price and quantity of oil in the world market directly affect economic output in the industrialized world. Apart from the actual price level, the rate of change
of the price and output of oil also affect economic output. If the world oil market were free and competitive, and if property rights were well-defined and adequately enforced by property owners, then output and prices generally would be stable, and the risks of sudden changes in output and prices would be low. If these risks were low, then arguably there would be no need for international military protection of oil supplies and markets.

Unfortunately, the world oil market is not always stable and competitive. Most of the world’s oil is in the Persian Gulf. OPEC\textsuperscript{1}, the Organization of Petroleum Exporting Countries, has between 66\% and 77\% of the world’s proven oil reserves. Saudi Arabia, Iraq, Kuwait, United Arab Emirates, and Iran, the biggest producers in the Persian Gulf, have between 53\% and 65\% (Energy Information Agency, International Energy Annual 1992, 1994, p. 102). Even though the Persian Gulf countries produce only a small fraction of their reserves\textsuperscript{2} and even though the United States imports only a small fraction of its oil from the Persian Gulf (see Table 15-1), the countries of the Persian Gulf can have a considerable influence on the world price of oil and thus on the economic welfare of the United States and other heavy users of oil. This influence can be direct and intentional, as when OPEC countries set prices and abide by output quotas, or unintentional, as the result of a conflict that disrupts production or flow and thereby increases price\textsuperscript{3}.

The more expansive conflicts in the Persian Gulf inevitably threaten oil supplies. For example, during the Iran-Iraq War (1980-1988), the combatants attacked oil tankers and other commercial vessels from neutral nations, and as a result, Kuwaiti tankers were reflagged and escorted through the Gulf by the U.S. Military. The Iraqi invasion of Kuwait and the subsequent Gulf War in 1991 caused a brief panic in oil markets: immediately following the invasion, the world price of a barrel of oil more than doubled, from $16.19 in July 1990 to $30.03 in October 1990 (Energy Information Administration, 1992, p. 6) (Figure 15-1).

Many economists believe that these price shocks hurt Western economies. As McNaugher (1985) notes, western economies have “structural rigidities...[which can] hamper rapid adaptation to sharp changes in factor prices” (p. 8) and thereby [perhaps]

\textsuperscript{1} The Organization of Petroleum Exporting Countries (OPEC) was created in 1960 to set world oil prices by controlling production. The 1993 members of OPEC were: Algeria, Gabon, Indonesia, Iran, Iraq, Kuwait, Libya, Nigeria, Qatar, Saudi Arabia, United Arab Emirates and Venezuela.

\textsuperscript{2} In 1992, all countries in the Middle East produced 17.6 million barrels per day, or 29\% of world crude-oil production. Saudi Arabia, Iraq, Kuwait, United Arab Emirates, and Iran produced 15.7 million barrels per day, or 26\% of world production. OPEC countries produced 41.4\% of world crude-oil production (Energy Information Agency, International Energy Annual 1992, 1994, p. 6).

\textsuperscript{3} Since World War II, over 90 military conflicts in the Middle East have claimed more than 2.3 million lives (see Table 15-2). Most of these regional conflicts have been territorial disputes, religious cleavages, ethnic dissension, or ideological contests (Martin, 1987, p. 10). They have ranged in scale from small border clashes, such as those between Saudi Arabia and the Yemens, to large-scale, high-technology conflicts, such as the Iran-Iraq War and the Gulf War, which combined resulted in over half a million casualties.
give rise to inflation, recession and unemployment in the aftermath. Since 1947 there has been a strong correlation between oil price shocks and recessions: nine of the ten recessions between 1947 and 1991 were preceded by oil shocks, and nine of the ten oil shocks were followed by a recession (Table 15-3). Even the mere threat of a disruption in the flow of oil from the Persian Gulf can generate price shocks that hurt the United States’ economy.

The United States cannot [easily] prevent OPEC from agreeing to set prices or restrict output, but it does believe that it can help prevent disruptions in production and flow due to wars in the region. Indeed, as we show next, the main objective of the U.S. military as concerns the Persian Gulf is to ensure that the oil flows freely.

15.1.2 United States military objectives and plans for the Persian Gulf

15.1.2.1 1973 to 1989: Protecting oil is a primary objective

In the 1970's and 1980's, the United States' had three key objectives in the Persian Gulf: to contain Soviet influence, to keep the region stable, and to guarantee uninterrupted access to the largest proven oil reserves in the world. For example, in FYs 1988 and 1989, the Joint Chiefs of Staff stated:

The security of the Middle East and Southwest Asia is critical to the economic health of the free world and, consequently, to the security of the United States. Regional stability, Free World access to oil resources, and the limitation of Soviet influence remain important US objectives. (Joint Chiefs of Staff, FY1988, p. 16; Joint Chiefs of Staff, FY1989, p. 21).

But even when the Soviet Union was a threat, it still was more important to protect the oil than to contain the Soviets (to the extent, even, that concern about Soviet


5 Of course, not all economists agree that price shocks have serious macroeconomic effects. For example, Bohi (1991) states that this conclusion is “far from unanimous in the economics literature” and that “there is no evidence to support either the wage rigidity hypothesis or the capital obsolescence hypothesis as an explanation of the effect of energy price shocks on macroeconomic behavior” (p. 145). Bohi proposes instead that monetary policy explains macroeconomic performance following price shocks. Toman (1991) takes a similar position. However, we point out that this alternative explanation is not so tidy, because monetary policy, while seemingly an independent variable, in practice might be related to price shocks. That is, if in the past governments responded to price shocks with policies that actually exacerbated the macroeconomic effects of the shock, one cannot dismiss the possibility that governments will make the same [bad] decisions again in the future.

6 The Strategic Petroleum Reserve (SPR) also is meant to ameliorate a shortfall in oil supply. We estimate the cost of the SPR separately, in Report #7 of this social-cost series (see the list at the beginning of this document).
expansion or regional stability could be separated from concern about the oil). The Joint Chiefs of Staff said so explicitly in every issue of the United States Military Posture Statement from FY1979 to FY1989. For example, in FY1982, the Joint Chiefs of Staff stated that:

"Of these interests [oil security, regional stability and Soviet containment], continued access to oil on reasonable political and economic terms is the most important to US and allied security" (Joint Chiefs of Staff, FY1982, p. 12).

In 1983, they stated that:

"US interests in the Middle East and Southwest Asia focus largely, but not exclusively, on the region's oil reserves" (Joint Chiefs of Staff, FY1983, p. 6).

Even U.S. efforts to resolve Arab-Israeli conflicts have been related to U.S. oil interests. Again, according to the Joint Chiefs of Staff:

The United States is determined to preclude disruption or hostile control of the vital resources and to limit the spread of Soviet influence in the area. Other US interests, important in their own right but bearing heavily on the security of energy resources, include peaceful resolution of the Arab-Israeli conflict and increased stability throughout the region (Joint Chiefs of Staff, FY1983, p. 6).

According to Kaufmann and Steinbruner (1991), the United States began contingency planning for the Middle East in 1974 - right after the 1973 oil embargo, which generated fears of an OPEC attempt to strangle the West by restricting oil supplies. Contingency planning became a more important part of U.S. military planning after 1980 (Kaufmann, 1992), as a result of the Iranian revolution and the Soviet invasion of Afghanistan, which confirmed the instability of the region. Those events eventually led to the Carter Doctrine which states:

An attempt by any outside force to gain control of the Persian Gulf region will be regarded as an assault on the vital interests of the United States of America and such an assault will be repelled by any means necessary, including military force (Carter, 1980, p. 197).

Also in 1980, the United States established the Rapid Deployment Joint Task Force (RDJTF), which in 1983 became the U.S. Central Command (CENTCOM). CENTCOM has a permanent staff of about 1,000. Its primary responsibility is to protect U.S. interests in Southwest Asia, including the Persian Gulf (Joint Chiefs of Staff, 1992, p. 4-3). Approximately one-fourth of the U.S. active Army and Marines Divisions, Aircraft Carriers and Fighter Wings have a first-priority commitment to CENTCOM (Sabonis-Chafee, 1987).

15.1.2.2 From 1990 on: Protecting oil is the “overall” objective

7 FY1989 is the last year for which this document is available.
The end of the Cold War essentially eliminated any Soviet threats to U.S. interests, including those in the Middle East, and made the U.S. reformulate its military strategy to focus on regional, rather than global conflicts. According to the Joint Chiefs of Staff, “In the past, force requirements were generated by focusing attention on global conflict...Today, the probability of such a conflict is greatly reduced. Thus, our focus has shifted to regional hot spots where the probability of occurrence may now be greater than in the past” (Joint Chiefs of Staff, 1992, p. 2-9)\footnote{In 1993, the Joint Chiefs of Staff used a “scenario-based analysis” in order to evaluate the ability of the U.S. military to respond to potential crises. One of the scenarios depicted is a crisis in Southwest Asia in 1999. This contingency scenario depicts a situation in which “an aggressor again threatens U.S. interests in Southwest Asia, attempting to improve access to ports in the Persian Gulf, increase its oil reserves, and further its ambitions of regional hegemony” (Joint Chiefs of Staff, 1992, p. 9-8). The Joint Chiefs emphasize that this scenario is neither a prediction of future events nor a description of a military strategy. However, they note that this scenario was chosen for three reasons: (1) it is plausible, (2) it is demanding in the sense that it will challenge the capabilities of the U.S. military, and (3) it encompasses U.S. alliance commitments and vital interests, (Joint Chiefs of Staff, 1992, p. 9-2). They also remind us that “although the likelihood of another Gulf War is low at the present time, the violent history of the Southwest Asia region warns us that lasting peace is even less likely” (Joint Chiefs of Staff, 1992, p. 12-2).}


In the Middle East and Southwest Asia, our overall objective is to remain the predominant outside power in the region and preserve U.S. and Western access to the region’s oil (U.S. Department of Defense, 1992; cited in Tyler, 1992).

\subsection{Counter arguments and summary}

We have made the case that the U.S. spends money on defense of the Persian Gulf mainly because of the oil there. Of course, not everyone would agree with this. In a recent analysis of the external costs of oil use in transportation, the Congressional Research Service (CRS) (1992) argues that concern about oil has been but one of many reasons that the U.S. military has cared about the Persian Gulf. The CRS (1992) even implies that oil security is a minor concern. In this section we review and rebut the CRS’ arguments.

First, the CRS (1992) claims that throughout the Cold War, the U.S. military was concerned more with the Soviet threat (per se) in the Persian Gulf than with U.S. oil interests. But the CRS does not offer any evidence in support of this claim, which is directly refuted by statements in the Military Posture documents that we have cited.
Next, the CRS (1992) claims that the U.S. military also is concerned with the security of Israel. But we see no evidence of a serious military concern for Israel per se, independent of concern about energy security. In the first place, the Military Posture statements cited above make it clear that the JCS cares about Israel only in the context of the Arab-Israeli conflict. On account of its oil interests in the Gulf, the U.S. does want the region to be stable, and to forestall and resolve Arab-Israeli conflicts. As cited above, the Joint Chiefs of Staff are clear on this. Thus, the U.S. military cares not about Israel per se, but about region stability -- because of the oil. And in any event, Israel has demonstrated that it can take care of itself. We believe that, if the Middle East had neither oil nor strategic importance, the U.S. would not maintain a significant military presence in the region solely to help protect Israel.

Third, the CRS suggests that another “major” interest is the protection of U.S. citizens. But we are hard pressed to conceive of this a “major” interest. In 1992, there probably were on the order of 20 thousand tourists in the Middle East, including Israel and Egypt, and fewer than 10 thousand in the oil-rich countries of Saudi Arabia, Iran, Iraq, Kuwait, and the United Arab Emirates -- out of a total of nearly 7 million U.S. tourists abroad (Bureau of the Census, 1992). About 50,000 U.S. citizens were residents (as opposed to tourists) in the oil-rich countries of the Middle East, but it is likely that most of them worked for oil companies or related ventures, the U.S. Government, or the U.S. military. There is little doubt that, were there no oil in the Middle East, there would be very few U.S. citizens there, and the U.S. would not spend billions of dollars to protect the few that were there.

Fourth, and in its view most definitively, the CRS (1992) claims that the failure of the U.S. to go to war after the 1973-74 and 1979 supply disruptions suggests that the U.S. military really wasn’t concerned with protecting oil supplies until perhaps the Gulf War. This claim is weak. There is no parallel between the 1973-74 and 1979 crises and the situation that led to the 1991 Gulf War, which the CRS does agree was motivated at least in part by a desire to protect oil interests. The 1973-74 disruption was the culmination of a politically motivated series of price increases and a trade embargo against the U.S. and the Netherlands, which were an Arab retaliation for the U.S.’ support of Israel in the 1973 Arab-Israeli “Yom Kippur” war. It would have been outrageous for the U.S. to have attacked the Arab embargoers just because they had decided that they did not wish to sell oil to the U.S. In fact, it would have been just as outrageous to have attacked Iraq in 1991 if Iraq had done nothing other than refuse to sell oil to the U.S. Conversely, the U.S. surely would have attacked Iraq or any other Gulf state, at any time during the 1980s, had the country done what Iraq actually did in 1990, and had the Soviet Union been out of the equation.

The 1979-1980 “disruption” was the result of another major price rise and of the shutting down of Iranian production due to the Iranian revolution, and it would have been almost as unreasonable (and foolish, given the attitude of the Soviet Union at the time) to have intervened in the internal affairs of Iran as it would have been earlier to have attacked Arab nations on account of their political stance. In short, it hardly is reasonable to proffer lack of outrageous and provocative military behavior as evidence
of lack of military interest. Consequently, the CRS' (1992) speculation about military impassiveness in the face of earlier oil “disruptions” does not stand against the unequivocal and steadfast mission statements by the U.S. military cited in this report.

The CRS also implies that the Reagan administration’s refusal to institute emergency price and supply controls in the aftermath of a severe price shock is evidence that the military was not charged with protecting oil supplies in the Persian Gulf. We fail to see the connection between pricing policy and military policy. Somewhat more to the point, the CRS states that the Reagan administration refused to “acknowledge” that it had any plan to use military force to prevent a price shock. This fact, though, has no import. In the first place, the Reagan administration might well have had such a plan, but have kept it secret. In any event, reluctance to start a war to keep oil cheap in no way implied that in the Persian Gulf the U.S. military was not primarily concerned with oil. Most likely, what the administration was “acknowledging” was the outrageousness of going to war over any price shock that was like the two previous ones. Had something like the Iraqi invasion of Kuwait happened, the Reagan administration most likely would have responded the way that the Bush administration did.

Summary. It is clear to us that the U.S. military cares (and always has cared) about the Middle East mainly because of the oil there. The United States believes that oil in the Persian Gulf is vital and often at risk, and hence demanding of a considerable commitment of U.S. military manpower, hardware, and planning. In the next section, we estimate the magnitude of this commitment.

15.2. ESTIMATES OF PEACETIME MILITARY EXPENDITURES IN THE PERSIAN GULF

15.2.1 Introduction

The U.S. spends a considerable amount of money protecting what it feels are its interests in the Persian Gulf. The exact amount is difficult to estimate, because the Defense budget is itemized not by region or mission, but rather, as shown in Table 15-4, by general function or cost area, such as operations and maintenance. Many of the functional areas cover more than one region or program, and hence one faces the difficult task of having to allocate joint costs to individual areas. Different analysts have handled this differently, and as a results estimates of the peacetime costs of maintaining a military presence in the Middle East range widely, from as little as $0.5 billion to as much as $64.5 billion per year (see Tables 15-5 and 15-6).

15.2.2 Literature review

Ravenal (1991) and Kaufman and Steinbruner (1991) have written book-length analyses of the U.S. military budget, including estimates of the portion attributable to U.S. interests in the Persian Gulf. Ravenal’s (1991) estimate that the U.S. spends $50 billion per year to defend the Persian Gulf, and Kaufman and Steinbruner’s (1991) estimate that the U.S. spends $64 billion per year, have been widely cited. Both groups
use what might be called a “total-cost” approach, in which joint costs, such as for the
Department of Defense’s (DoD) overhead, and forces with multiple missions, are
allocated to all of the affected programs and thereby counted as economic costs of the
mission or program.

By contrast, the DoD’s own assessment of what it spends to defend the Persian
Gulf counts only those forces or programs that would be eliminated immediately and
entirely if the U.S. had no interests in the Persian Gulf; it excludes all expenditures for
DoD-wide overhead and for forces and programs that are assigned only partly to the
Persian Gulf (reported in the U.S. Government Accounting Office [GAO], 1991).

These and other estimates are reviewed in this section.

**Ravenal (1991).** Ravenal begins by dividing the Defense budget for FY1992 into
two components: strategic nuclear forces and general purpose forces. He estimates that
the budget can be allocated as follows (Ravenal, 1991, p. 44):

<table>
<thead>
<tr>
<th>Component</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Strategic Nuclear Forces</strong></td>
<td>$63 Billion</td>
</tr>
<tr>
<td><strong>General Purpose Forces</strong></td>
<td>$215 Billion</td>
</tr>
<tr>
<td><strong>Total defense budget</strong></td>
<td>$278 Billion</td>
</tr>
</tbody>
</table>

To allocate the cost of general purpose forces to the various regions of the world,
Ravenal uses the percentage of active land divisions (Army and Marine) attributable to
each region. He includes “not just the divisions actually deployed there, but those
procured and maintained primarily for contingencies in the region” (Ravenal, 1991, p.
50).

The Pentagon usually divides the world into three regions: NATO/ Europe, Asia
(i.e., East Asia and Western Pacific), and “Other Regions and the Strategic Reserve,”
which encompass Southwest (SW) Asia. Ravenal bases his distribution of the active
land forces among the various regions through an analysis of “all rationales and
descriptions in the report of the Secretary of Defense and other sources” (Ravenal, 1984,
p. 20). He estimates that, at the end of FY1992, the U.S. peacetime forces primarily
attributable to “Other Regions and Strategic Reserve,” accounted for $\frac{4}{17}$ of the 17
peacetime active land divisions, 4 of which could be ascribed to the Persian Gulf. Thus,
Ravenal estimates that $\frac{4}{17}$ (23.5 percent), or $50 billion, of the $215 billion he attributes
to general purpose forces was due to U.S. interests in the Persian Gulf in FY1992.

Ravenal also estimates the “admittedly amorphous costs of possible wars of
various types” (Ravenal, 1991, p. 46): an expected cost of $5.3 billion per year due to
conventional wars, and $5 billion per year due to a nuclear war.

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9 Since this figure is based on the peacetime force structure at the end of FY1992, it does include changes
due to the diminished threat of a Soviet invasion. By that time, U.S. military strategy began to focus on
fighting multiple simultaneous regional conflicts, rather than large-scale global confrontations.

10 Ravenal (1991) speculates that over a decade there might be a 10% chance of having a conventional war
that costs half as much as did the Vietnam war, and an 0.25% chance of having a nuclear war that costs
25% of GNP. Ravenal estimates that the Vietnam war cost about $1,050 billion in 1991 dollars. Thus, the
Kaufmann and Steinbruner (1991). Their estimate of $64.5 billion (1992 dollars) in FY 1990 for the non-nuclear defense of the Middle East is based on a logic similar to that used by Ravenal. They allocate the budget authority to “force planning contingencies” in different regions of the world. These contingencies are scenarios developed by the Pentagon indicating where U.S. forces may be needed and are used to publicly justify the Defense budget. Their breakdown of the FY 1990 Defense budget is shown in Table 15-7.

The Soviet invasion of Afghanistan, combined with the presence of a significant amount of Soviet troops on the Iranian border, represented the primary threats to Gulf stability in FY 1990, according to Kaufmann. Repelling a Soviet attack would require at least six divisions and nine fighter wings. In order to maintain such a presence, it would be necessary to preposition three carrier battle groups and one Marine amphibious force in the Indian Ocean.

Obviously, the military balance has shifted dramatically since FY 1990. However, Kaufmann and Steinbruner (1991) note that the collapse of the Soviet Union did not have a significant effect on the cost of defending the Gulf the following year: “although the threat [to the Gulf] shifted from the USSR to Iran by the time of the fiscal 1991 budget, the forces included in the Persian Gulf contingency package remained the same as before...” (p. 14).

General Accounting Office (GAO) (1991). The GAO asked the DoD to estimate its expenditures related to U.S. interests in SW Asia. In the information it provided to the GAO, the DoD distinguished four kinds of military expenditures: i) for programs “dedicated” to SW Asia; ii) for programs “oriented” to SW Asia; iii) for general contingencies and mobility related to SW Asia; and iv) for Operation Earnest Will (Table 15-8). The DoD estimated that the United States spent a total of $21.4 billion on military programs “dedicated” to Southwest Asia between FY1980 and FY1990. This money funded construction, pre-positioning, operation of CENTCOM, and military exercises intended mainly for the defense of SW Asia. However, DoD said that two of these programs (including the most costly of the group) were not really dedicated to SW Asia, and would have been funded even if the U.S. had no interests in SW Asia. In fact, according to the DoD, only $4.5 billion worth of “dedicated” programs -- less than $0.5 billion per year -- would not have been funded (Table 15-8).

The DoD estimated that the U.S. spent $5.8 billion on Southwest Asia- “oriented” (as opposed to Southwest Asia- “dedicated”) programs. These were defined as those

11 The budget authority for fiscal year 1990 was completed prior to the demise of the Soviet Union and Iraqi invasion of Kuwait. Kaufmann and Steinbruner (1991) note that “the defense budget for that year is the last in what may be thought of as the long cold war series.” (p. 6).
programs which were motivated by the defense of U.S. interests in Southwest Asia and in other regions. But even though these programs were partly geared toward SW Asia, the DoD claimed that all of these programs would have been funded fully, in order to protect interests outside of SW Asia, regardless of what happened to U.S. interests in the Gulf.

The DoD also estimated that the United States spent $272.6 billion on “other contingencies and mobility programs” over the 10-year period (Table 15-8). These programs allowed the U.S. to defend its interests in many regions, including but not primarily Southwest Asia. The cost of maintaining the forces available to CENTCOM accounted for $220.3 billion of this. The DoD believed that this entire amount would have been budgeted regardless of U.S. interests in the Middle East.

The DoD/GAO grand total, including the amount spent to reflag Kuwaiti tankers during the Iran-Iraq war (“Operation Earnest Will”), is only $4.7 billion over 10 years. This is out of about $300 billion worth of programs that nominally were “dedicated” or “oriented” or generally in some way related to SW Asia (Table 15-8). This striking difference is due to the suspect claim that virtually all of these programs would have been funded fully regardless of U.S. interests in SW Asia -- a claim which we will address momentarily. The GAO also estimated that the U.S. provided $66.2 billion in military, economic, and multilateral assistance to countries in SW Asia. We discuss economic assistance below.

Moreland (1985). "Moreland applies a modified form of the CIA methodology used for estimating military spending in the Soviet Union. He divides the total budget of each force by the total active-duty personnel, to come up with a cost per active-duty soldier, ascribing each soldier to only one (his primary) mission. Moreland’s analysis arrives at $54 billion per year for the Persian Gulf, or 23% of the conventional forces budget” (cited Sabonis-Chafee, 1987, p. 2).

Newsweek (1987). In an interview published in Newsweek, Former Secretary of the Navy John Lehman estimates that the U.S. spends approximately $40 billion annually maintaining a military presence in the Middle East. However, he does not provide any information explaining how this estimate was developed. (Newsweek, 1987).

15.2.2.1 Effect of the collapse of the Soviet Union

Most of the estimates shown in Table 15-5 were done before the dramatic recent changes in the balance of power globally and in the Gulf. The threat of a Soviet invasion has vanished, the Iran-Iraq war is over, and Iraq was defeated in the 1991 Gulf war. However, as we argued above, the U.S. primary interest in the region always has been oil, and nothing that has happened in the past few years has made the oil resource in the Middle East more secure. The risk of a supply disruption and price shock, and hence the perceived need for military protection, has not diminished. Given the huge oil reserves and the history of instability in the region, this perceived need will not diminish for the foreseeable future. If the primary military objective in the region has not changed, then the estimates cited here -- even those made during or before the
recent shifts in global and regional power -- are reasonable approximations of recent military expenditures on the Persian Gulf.

15.2.2.2 Which estimate is right?

As mentioned above, the DoD’s estimate (GAO, 1991) excludes all of the cost of any force or program or function -- including DoD-wide “overhead” -- that serves more than just the Persian-Gulf interest. We shall refer to these excluded costs as joint costs. In contrast, the rest of the researchers allocate joint costs across all of the affected regions. Which approach is correct?

First, let us pose the correct question: if the U.S. suddenly had no interests in the Persian Gulf, how much would Congress reduce the defense budget, year by year, over the long haul? This question properly acknowledges the role of Congress in determining expenditures, and accounts for changes over time. It simply is a mistake -- not an analytical option, but simply a mistake -- to ignore “long-run” effects. In principle, one must estimate and discount to present-value the costs and benefits in each year. If the DoD has ignored some costs only because they would not have been foregone immediately, then the DoD has made an error.

Second, let us distinguish two kinds of joint costs: the cost of non-combat DoD-wide overhead ["fixed" costs], and the cost of combat military programs or missions that serve more than one region. This distinction is especially important in an analysis of the defense budget because a large fraction of the budget comprises overhead, administration, non-combat units, defense agencies, and other DoD-wide activities that are not attached to any one mission or program or region.

Now, let us again ask the right question -- if the U.S. suddenly had no interests in the Persian Gulf, how much would Congress reduce the defense budget, year by year, over the long haul? -- but this time with respect to fixed costs specifically. Because these costs are not assigned to any one mission or program or region, it is difficult to know how Congress would budget for them if the U.S. no longer was interested in the Persian Gulf. In principle, of course, all fixed costs are variable in the long run, but Congress might or might not act in accordance with this principle. At one extreme, one might argue that Congress would cut only the obvious short-run variable combat costs of defending the Persian Gulf, and would never bother to consider the potential for reducing “fixed” costs as well. This apparently is the belief of the GAO, and, when it is convenient, of the DoD. At the other extreme, one might assume that Congress

12 Ravenal (1991) notes that “Pentagon budgeteers will complain that it makes no sense to allocate certain categories of support and overhead, such as, in the extreme case, retirement pay, to combat functions” (p. 18). Presumably, this complaint follows from the thought that how much the military pays in retirement benefits today has nothing at all to do with current missions or expenditures. This is true, but irrelevant: the retirement-pay cost associated with current missions is the future retirement pay of those serving today, not the current pay of those who have already served. Total retirement pay is a function of total man-years of service; thus, if you eliminate a military mission and thereby reduce expected man-years of service, you will reduce future retirement payments. These foregone future payments should be discounted to present dollars, but they should not be ignored.
immediately would identify and eliminate the share of fixed costs associated with direct combat expenditures for the Persian Gulf. It could do this by closing bases, reducing staff, selling property, consolidating activities, and so on.

We believe that Congress might in fact reduce outlays for general overhead and support if the U.S. no longer had an interest in the Persian Gulf, and that it would do so relatively quickly. The Federal budget is so tight, and the potential “peace dividend” so large, that it is not unreasonable to believe that Congress would take the opportunity to reduce DoD overhead.

Next, let us ask the question -- if the U.S. suddenly had no interests in the Persian Gulf, how much would Congress reduce the defense budget, year by year, over the long haul? -- this time with respect to the cost of combat military programs or units that serve more than one region. The DoD argues that all of such programs would be fully funded regardless of U.S. interests in the Persian Gulf. This might be true if: a) all multi-regional programs were sized to deal with the “biggest” regional threat, and the Persian Gulf was not the biggest regional threat; b) forces and programs were developed to respond to only one regional problem at a time; c) no programs had any components specifically for the Persian-Gulf mission; and d) we were interested in a marginal rather than an average analysis.

For the DoD estimates to be correct, all of these conditions must hold. We doubt that they do, at least to the extent that the DoD avers. Actually, we think that the DoD estimates are disingenuous, and that the GAO (1991) is too credulous. If it really were true that eliminating the Persian-Gulf missions would not save anything, then it would follow that the DoD would not have to ask for any additional money if a new Persian-Gulf-like interest were to materialize. In response to Congressional inquiry into the cost of defending such an important and extensive new regional interest, honest DoD officials would reply: “We do not need any additional money to defend this important new interest, because we merely will add the region to the list of areas covered by existing forces”. More likely, of course, the DoD would insist that substantial additional resources would have to be devoted to defending the new interest.

Ravenal (1991) puts it well:

“When attempting to justify its entire defense budget request, or when demonstrating to our allies that we are paying a disproportionate share of the costs of an alliance, the Pentagon prefers to state its costs fully. But when defending against proposed cuts, it claims that deleting this or that unit or program from the force structure or the budget would save only the tip of its marginal costs” (p. 19).

In the end, then, we believe that the estimates of Ravenal (1991) and Kaufmann and Steinbruner (1991) are more accurate than the DoD’s (GAO, 1991)[13] although we

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[13] We are uncomfortable with the DoD (GAO, 1991) estimates for another reason. As Ravenal (1984; 1991), and Greene and Leiby (1993) have complained, if the DoD accounting were generalized, the estimated total budgetary cost of all of DoD’s missions would be considerably less than the actual total DoD budget. This seems to us a misleading picture.
do accept that some of multi-regional forces and programs would not be affected significantly if the Persian Gulf mission were eliminated. On the basis of their work, and without doing a formal analysis, we judge that every year in times of peace, the United States spends at least $20 billion to protect its interests in the Persian Gulf, and perhaps as much as $40 billion (cf. estimates in Table 15-5). These figures do not include the expected cost of occasional conventional or (improbably, we hope) nuclear wars.

15.3. U.S. ASSISTANCE TO THE MIDDLE EAST: ATTRIBUTABLE TO OIL INTERESTS IN THE GULF? (MOSTLY NOT)

The United States maintains an influence in the Middle East not only through the projection of military power, but also through foreign military sales and various types of foreign aid to countries throughout the region. Countries of the Middle East receive over 90 percent of all U.S. military grants, and over one-third of all U.S. foreign grants provided in FY1992 (Table 15-9). But can any of the $5.9 billion in U.S. grants to countries in the Middle East be attributed directly to U.S. oil interests in the region?

Virtually all of this $5.9 billion goes to Israel, Egypt, and Turkey. It is likely that none of the grants to these countries are expressly related to U.S. oil interests, primarily because these countries do not produce much oil. However, to the extent that grants to these countries are meant to promote regional stability (as opposed to, say, economic development purely for the benefit of the country), they arguably are related to U.S. oil interests, because the U.S.’ main reason for wanting to keep the region stable is to keep the oil accessible and inexpensive. We will argue that none of the grant aid to Israel is meant to promote regional stability, and that although some of the grant aid to Egypt and Turkey is, the amount is relatively small.

Israel receives more outright grant money from the U.S. than does any other country in the Middle East. However, it appears to us that the U.S. gives aid to Israel because of the strong Jewish lobby not out of a desire to maintain stability in region (and hence protect oil supplies). Indeed, U.S. aid to Israel antagonizes the Arab members of OPEC, and foments regional instability and ill-will towards the U.S. Thus, U.S. aid to Israel undermines U.S. oil interests in the Persian Gulf.

14The U.S. Defense Department spent around $61 billion on the 1991 Gulf War (GAO, 1992, p. 51), although U.S. allies did pledge to contribute approximately $48 billion to offset some of these costs (GAO, 1992, p. 53). However, the human and economic toll of the war probably exceeded $100 billion.

15We ignore loans because they are supposed to be paid back, and sales because they are beneficial trade. Only outright grants are economic costs to the U.S.

16According to a report in the Wall Street Journal, “80 pro-Israel PAC’s [political action committees] spent more than $6.9 million during the 1986 [election] campaigns, making them the nation’s biggest-giving narrow-issue interest group” (Fialka, 1987).
The U.S. better serves its oil interests in the Gulf when it sides with oil-owning Arab nations against Israel rather than the other way around. This was demonstrated negatively in 1973 and 1974, when OPEC placed a temporary embargo on oil shipments to the U.S. and the Netherlands in retaliation for their support of Israel in the Arab-Israel War of October 1973. It was demonstrated positively during the Persian Gulf War, when Israel not only was excluded from the U.N. coalition, but was pressured to refrain from retaliating against Iraqi missile attacks on its territory, in order to maintain the support of the Arab nations. There is little doubt, then, that the U.S. helps Israel for reasons other than oil, and would continue to give Israel $3 billion per year even if there were no oil in the region.

Egypt is the second largest aid recipient in the region. To some extent, aid to Egypt is motivated by a desire to promote regional stability, which in turn is motivated by the desire to protect the oil there. A strong relationship with Egypt also provides the United States with an alliance with an important Arab nation and helps the U.S. maintain an influence in the region. Thus, an argument could be made that at least some of the $2.2 billion in grants to Egypt could be linked to U.S. oil interests.

U.S. aid to Turkey is small relative to that provided to Israel and Egypt -- less than half a billion dollars. Some of this aid is the result of Turkey’s membership in NATO and is therefore not directly linked to oil objectives in the Gulf. However, Turkey was used as a base of operations during the Gulf crisis, so it is possible that at least some of this aid can be attributed to U.S. interests in Gulf oil.

In summary, the U.S. provides almost $6 billion annually in grants to countries in the Middle East, $5.2 billion of which goes to Israel and Egypt. We believe that substantially less than $2 billion of this can attributed to oil interests in the region -- that is, that if there were no oil in the Middle East, the U.S. would scale back its assistance to Middle East countries by considerably less than $2 billion. Moreover, even if the U.S. did give less grant aid to the Middle East, it very well might give more to other regions. (Although, if this were the case, one would have to consider that there might be a cost to the U.S. of not giving to these other regions now. It is not clear, then, that U.S. oil interests in the Middle East cost the U.S. more than a trivial amount in grant aid. We assume that the net cost of grant aid attributable to Middle East oil is small enough to be ignored.

15.4. FROM THE COST OF DEFENDING ALL U.S. INTERESTS IN THE PERSIAN GULF, TO THE COST OF DEFENDING OIL CONSUMED FOR TRANSPORTATION

15.4.1 The four steps of the allocation

17 Our position, then, is that if there were no oil in the Persian Gulf, the U.S. would not spend money just to defend Israel, but would continue to grant economic assistance to Israel.
In this section, we work from our estimate of the cost of defending all U.S. interests in the Persian Gulf towards an estimate of the military cost of using oil in highway transportation. We start with the estimated $20 to $40 billion spent annually to defend all U.S. interests in the Persian Gulf (see section 15.2.2.2), and deduct: i) the cost of defending interests other than oil in the Persian Gulf; ii) the cost of defending against the possibility of a world-wide recession due to the effects of an oil price shock related to the use of Persian-Gulf oil by other countries (such a recession would harm the U.S., even if the U.S. did not produce or consume oil); the cost of defending the investments of U.S. oil producers in the Persian Gulf, apart from the interests of U.S. consumers; and iv) the cost of defending the use of oil in sectors other than highway transportation. The steps of the estimate are summarized in Table 15-10.

15.4.1.1 The cost of defending interests other than oil in the Persian Gulf

In the first section of this report, we cite evidence that in the Persian Gulf, the U.S. cares more about the oil than about anything else. If oil security accounts for more than 50% of U.S. “interest” in the Persian Gulf, and if military expenditures in some sense are proportional to degree of interest, then, loosely speaking, less than 50% of the cost of defending the Persian Gulf should be assigned to interests other than oil. Of course, military expenditures probably are not strictly proportional to degree of interest, however measured, because of the “fixed” costs of defending the region -- costs that are incurred if there is any regional defense at all, regardless of its size, scope, and purpose. Nevertheless, for want of a better analysis, we assume that these non-oil interests are responsible for 25% to 50% of the $20 to $40 billion spent annually to defend the Persian Gulf.

15.4.1.2 The cost of defending against the possibility of a world-wide recession due to the effects of an oil-price shock related to the use of Persian-Gulf oil by other countries

Rapid price changes could occur and would affect the U.S. even if the U.S. did not import any oil from the Middle East. A Congressional Research Service (CRS) analysis conducted after the Gulf war concluded that “so long as domestic suppliers of energy can participate in these [world-oil] markets, disruptions to the world supplies of energy will be felt even in a self-sufficient United States as domestic suppliers of the affected energy source divert their supplies to foreign markets and as suppliers of substitute energy sources do the same” (Makinen, 1991, p. CRS-7). Moreover, even if the U.S. did not produce or consume any oil at all, it still would be hurt by a world-wide recession triggered by a rapid increase in oil prices, at a minimum because foreign demand for U.S. goods and services would decrease. As the CRS points out, “the only way to prevent this sequence of events from occurring would be to completely isolate the U.S. from foreign markets” (Makinen, 1991, p. i). Unfortunately, we have no way of estimating how important it is for the U.S. to protect itself against this effect alone, as distinct from effects related to U.S. production and consumption of Persian-Gulf oil. We believe, though, that the interest is not trivial. We simply assume that this general interest in preventing any price shock, regardless of U.S.
oil imports, is as important as the interests related specifically to U.S. production and consumption of Persian Gulf oil.

15.4.1.3 The cost of defending the investments of U.S. oil producers in the Persian Gulf, apart from the interests of U.S. oil consumers

Even if the U.S. did not consume any oil at all, and somehow was completely insulated from the effects of a worldwide recession brought on by sudden increases in the price of oil, it still probably would spend money to defend Persian-Gulf oil, because U.S. corporations own billions of dollars worth of assets in the petroleum industry in the Persian Gulf and sell billions of dollars worth of Persian-Gulf oil worldwide. One perhaps can gain some sense of the need to defend the interests of producers per se by comparing the value of U.S. assets or oil sales in the Middle East with the value of U.S. consumption of oil from the Middle East.

At the close of 1992, foreign affiliates of U.S. multinational petroleum companies\textsuperscript{18} had total assets of $275 billion (Survey of Current Business, June 1994), and total sales of about the same magnitude. On the basis of data on direct investment abroad by country (Survey of Current Business, August 1994\textsuperscript{19}) we estimate that at least 3.5\% of these of

\textsuperscript{18}Includes companies engaged in oil and gas extraction, oil and gas field services, oil refining, and oil transportation.

\textsuperscript{19}The Bureau of Economic Analysis (Survey of Current Business, 1994) does not report the amount of assets of the foreign affiliates that are associated with the Middle East. It does, however, report “direct” investment abroad by country. We have assumed that the Middle East share of total assets of foreign affiliates of U.S. petroleum companies is at least as great as the Middle East share of total direct investment abroad, which as explained next is 3.5\%.

1992, the U.S. petroleum industry had a “direct” investment of $2 billion dollars in the Middle East, out of a total direct investment abroad of $57.5 billion (Survey of Current Business, August 1994). Direct investment in the petroleum industry in the Middle East was equal to direct investment in working petroleum companies in the Middle East plus investment in companies in the Middle East that actually were holding companies for working companies in other regions.

The U.S. petroleum industry also had an “indirect” investment in the Middle East, via holding companies in other parts of the world. However, an indirect investments via a holding company in a second foreign country was counted as a direct investment in the country of the holding company, not as an indirect investment in the ultimate country of origin. That is, the Bureau of Economic Analysis counted a direct investment in the Middle East by a U.S. foreign affiliate located in, say, the Netherlands as a direct investment in the Netherlands, not as a direct or indirect investment in the Middle East.

Ideally, to get a true picture of working investment in the Middle East, we would deduct U.S. investment in holding-company affiliates in the Middle East, but add investment in holding-company affiliates, located in other regions, that invest in working affiliate companies in the Middle East. No such data are available, but we suspect that the addition would exceed the deduction: it seems, for example, much more likely that U.S. companies will have in Europe holding companies for Middle-East operations than have in the Middle East holding companies for European operations. The Middle East has most of the oil; it is the necessary place for operations, but given its instability, unfamiliarity, and remoteness, certainly not a good place for a non-operating holding company. Thus, we expect that U.S. affiliate operations in the Middle East account for at least 3.5\% of direct investment -- and assets -- in all foreign petroleum operations.
total assets, or at least $9.6 billion, was owned by foreign affiliates in the Middle East. Sales by foreign affiliates in the Middle East probably were of the same order of magnitude. However, U.S. parent companies and individuals do not own all of the assets of their foreign affiliates. Although we do not have data on the ownership of total assets by country, we do have data on the external financial position of foreign affiliates in the petroleum industry: at the close of 1992, the balance sheet showed U.S. parent companies and other U.S. individuals in the petroleum industry with 41% of the external funds (equity, liabilities, long-term debt) of their foreign affiliates, worldwide (Bureau of Economic Analysis, 1994). If U.S. petroleum companies and other U.S. individuals owned 41% of the total assets of their foreign affiliates in the Middle East, then the value of the U.S. investment in the petroleum industry in the Middle East was at least $4 billion and perhaps considerably more.

Interestingly, these figures are of the same order of magnitude as the value of U.S. imports from the Persian Gulf: recently, the U.S. has been importing about $10 billion worth of oil every year from the countries of the Middle East (EIA, Annual Energy Review 1993, 1994). Therefore, on the basis of these illustrative statistics, we assume that “interests” of U.S. producers in the Persian Gulf are 50% to 100% of those of U.S. consumers of Persian Gulf oil, and that military expenditures should be apportioned accordingly.

15.4.1.4 The cost of defending the use of oil in sectors other than highway transportation

The deductions to this point leave us with the cost of protecting U.S. consumption of Persian-Gulf oil in all sectors (ground transportation, heating, power plants, etc.). Because this is the cost of U.S. consumption per se, (because costs attributable to U.S. production, world oil use, and non-oil interests already are accounted for), it is reasonable to assume that it is proportional to the amount consumed. The last question, then, is: what fraction of Persian-Gulf oil is used by motor vehicles? Or, to put it another way, if motor-vehicles consumed X fewer barrels of oil, what fraction of X would have come from the Persian Gulf? (Keep in mind that the motor vehicle sector consumes much more oil than is imported from the Persian Gulf.)

At the margin, or even on average, the source of the oil used by motor vehicles depends on short-run and long-run production costs, contractual obligations, national laws and policies, the quality of the oil, transportation arrangements, corporate strategies, and other factors. In the long run, it is likely that a reduction in oil use mostly will reduce exploration for and production of domestic oil, because the marginal oil in

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20 Data from the EIA (Performance Profiles of Major Energy Producers 1992, 1994) suggest that as much as 15% of the total foreign investment by petroleum companies might be in the Middle East: between 1986 and 1992, 10-16% of the total foreign income tax paid by 25 major energy companies (mostly petroleum companies) was on income from the Middle East.

21 This estimate of $4 billion is consistent with the Bureau of Economic Analysis’ (BEA) estimate of $2 billion in “direct” investment (footnote 19, above), because as discussed in footnote 19, the BEA’s estimate excludes “indirect” investment, and probably is an underestimate. See also footnote 20.
the U.S. is so costly to produce. In the short run, the picture is less clear. In the absence of a formal model of the regional supply of oil to the motor vehicle sector, we estimate that anywhere from 25% to 70% of Persian-Gulf oil goes to the motor-vehicle sector, and 75% to 30% to other sectors. This estimate is developed in Report #10.

15.4.2 Other issues

15.4.2.1 The beliefs of policy makers versus the beliefs of analysts

It is important to note that resources will be devoted to the military to protect U.S. oil interests if the President and the U.S. Congress, who propose and approve the military budget, believe that it is important to protect oil supplies. That is, for any case at hand, it does not matter if analysts such as Bohi (1991) and Toman (1991) are right in asserting that the macroeconomic costs of price shocks need not be large; what matters is what the decision makers believe. Of course, one would hope that eventually decision makers would believe what was true, but this is only a hope, and in any event the “truth” presently is subject to debate.

15.4.2.2 Free riders on U.S. defense

Should some of the U.S. military cost be allocated to oil consumption and production by other nations, on the grounds that these other nations benefit from U.S. military expenditures? The answer is an unambiguous “no”. These other nations are free riders, and whenever there are free riders the incidence of benefits does not correspond to the incidence of costs. In an economic cost or cost-benefit analysis, the relevant question always focuses on opportunity cost, on the counterfactual: if the U.S. did not have oil interests in the Persian Gulf, and in fact was completely insulated from any worldwide recessions traceable to any country’s use of Persian Gulf oil, would it spend money (without reimbursement or reciprocation) to protect oil in the Persian Gulf? Obviously not. U.S. expenditures are motivated entirely by U.S. interests, broadly defined; no interests, no expenditures. The presence of free riders cannot change this reality22.

15.4.2.3 Military spending and economic growth.

One might ask if military spending affects economic growth, and hence has social benefits or costs in addition to the direct expenditures. One could argue, for example, that technological spin-offs of military research and development become a positive externality in the private sector and contribute to economic growth. However, there is no strong evidence that defense spending spurs economic growth. Most studies have found either no link between defense spending and economic growth, or else weak and ambiguous links.

22If U.S. allies reimburse the U.S., or otherwise have an explicit quid-pro-quo agreement regarding U.S. military services, then the U.S. cost is equal to its expenditures less the reimbursement or exchange.
Huang and Mintz (1991) found that military expenditures have not had any significant effect, external or otherwise, on economic growth. Payne and Ross (1992) found “no causal relationship in either direction between defense spending and economic performance” (p. 161). Dunne (1990) stated that model results “do not suggest that the share of military expenditures is a significant influence on the unemployment rate...The fear that reductions in the share of military expenditures will be associated with higher average unemployment levels is misplaced” (p. 57). Kinsella (1990), Gold and Adams (1990), and Huang and Mintz (1990) also found no links between defense spending and economic growth.

There are some suggestions that reductions in defense spending boost the economy. Huang and Mintz (1991) found that non-military government expenditures have contributed to economic growth, which suggests that it might be productive to transfer funds from the military pot to other government pots. Others have reached similar conclusions. According to the Congressional Budget Office (1992):

Over the long term, the so-called peace dividend -- if used to reduce the federal deficit -- would increase national savings and investment and would therefore benefit the economy. By the next decade, the dividend realized under the 1991 plan could result in a permanent increase in GNP of around $500 billion a year (in 1992 dollars)...Over the next few years, however, applying the dividend to deficit reduction could adversely affect the economy, lowering GNP and employment, unless an expansion of monetary policy offsets defense spending cutbacks. The short-run changes will be modest in the national economy -- within the normal range of variation in GNP -- and in state economies, but could be serious for some industries and local communities.

Findlay and Parker (1992) noted that:

Increases in military spending cause a significantly larger increase in interest rates than do increases in non-military spending...Our results then suggest that the crowding out of private expenditures can be reduced when the government shifts resources from military spending to non-military spending (p. 195).

However, others have found that reductions in defense spending might hurt the economy. Atesoglu and Mueller (1990) estimated a two sector production function of the economy and found that:

there is a positive and significant relation between defence spending and economic growth. But, findings indicate that the responsiveness of economic growth to changes in defence spending is small. If there are significant cuts in defence spending - except for very large sustained cuts - the adverse effects on the economic growth of the United States should not be large (p. 19)

Thomas et al. (1991) analyzed the economic impacts that would result from a reduction in defence spending, and found that “reducing the level of defence spending will reduce real output, the price level, and employment. The effects of such a reduction will tend to attenuate after about five years” (p. 195). Similarly, Mehay and
Solnick (1990) estimated the impact of total defense spending and of investment and operation expenditures on state economic growth, and found that:

Aggregate defense spending was found to be positively related to both state growth measures. However, when defense outlays are disaggregated, only investment-type spending is positively related to personal income growth, whereas both investment and operating programs appear to influence employment growth (p. 484).

It appears, then, that defense spending does not necessarily have strong economic effects one way or the other. Payne and Sahu (1993) sum up prevailing views well:

Studies in this volume show that there are theoretical bases for expecting defense spending to have an effect on economic growth both for industrialized and less developed countries. While the economic growth could be affected both from the supply-side and the demand-side, the net effect of the diverse forces on economic growth of a nation is theoretically ambiguous. Measuring the impact of defense spending on economic growth then ultimately becomes an empirical question...Most studies cited in the volume suggest that defense spending has rather modest effect on the economic growth of an industrialized nation...In light of the weak link between defense spending and economic growth for developed countries, one should realistically expect that a reduction in defense spending would not make a significant difference...The defense cuts, however, mask some harsh realities at the regional levels. Defense-based communities may be very hard hit (p. 14-15).

On the basis of this brief literature review, we conclude that defense spending does not have any offsetting economic benefits or additional external costs.

15.4.2.4 Security costs other than peacetime military expenditures for the Persian Gulf

Expenditures on the military are only a portion of the entire relevant “security” cost of using oil. Just as the total social cost of pollution due to cars is equal to the value of the resources devoted to controlling pollution (the control cost) plus the value of the resources damaged by whatever pollution still is emitted (the residual damages), the total security cost of using oil is equal to the military “control” cost plus the dollar cost of whatever security problems remain in spite of or even due to the military expenditures. These “residual” security costs include reduced flexibility in the conduct of U.S. foreign policy, and strains on international relations due to the activities of the U.S. military and even to competition for oil (U.S. Department of Energy, 1987). We acknowledge but do not quantify these costs. Also, we have not included the additional cost of occasional wars, such as the Gulf War of 1991 (see above), or the military cost of protecting oil interests in any other regions. For example, the U.S. might be spending money to defend oil pipelines and ports in Alaska, oil refineries in the Caribbean, and oil fields in South America, Africa, and Indonesia.

15.4.2.5 “Optimal” versus actual expenditures
It may well be that whatever the U.S. is spending on the Persian Gulf is too much (or, doubtfully, too little), and can be reduced without compromising any U.S. interests or missions. If Congress recognizes this, and decides that it can provide for what it perceives to be necessary missions in the region at less cost, then present expenditures overestimate future costs. Several researchers have argued that defense expenditures in the Middle East can, in fact, be reduced without compromising U.S. objectives in the region. Kaufmann and Steinbruner (1991) use Defense Secretary Cheney’s Future Years Defense Plan (FYDP) for FY 1996 as a baseline for one such projection. They estimate that $55.1 billion of Cheney’s total budget of $243.7 billion should be allocated to the Middle East, and then propose two alternative force planning contingencies for FY 2001 for the Middle East: one that requires $45 billion, and a “low-cost” option that requires $29 billion (Table 15-11).

Carpenter and Fiscarelli (1990) and Ravenal (1991) argue that the benefits of protecting the Persian Gulf are substantially less than the military costs. Carpenter and Fiscarelli (1990) believe that the U.S. should transfer much of the burden of protecting the Gulf to its Western allies and thereby reduce its own military expenditures for the region from some $40 billion to year to $10 billion per year (Table 15-11). Ravenal (1991) suggests that U.S. stop policing the Gulf altogether and instead let the private sector protect against supply disruptions by developing domestic petroleum and non-petroleum fuels and using petroleum more efficiently.

15.4.3 Conclusion
To estimate the military cost of using Persian-Gulf oil in transportation, one must evaluate a series of grand counter-factuals (“If the U.S. had no interests in the Persian Gulf at all...”; “If there were no oil in the Persian Gulf...”; “If the U.S. produced but did not consume oil...”). These counterfactuals account for the fact that, in regards to the Persian Gulf, the U.S. cares not only about the use of Persian-Gulf oil in transportation, but also about the use of Persian-Gulf oil in non-transportation sectors, the interests of U.S. oil producers in the Persian Gulf, the stability of the world price of oil, and even matters unrelated to oil. Unfortunately, these counterfactuals are essentially untestable, and indeed barely susceptible to formal analysis. Much of the analysis is judgment. Although we believe that our conceptual outline is correct, and that our estimated ranges are not silly, we recognize that other analysts might disagree with us, perhaps vehemently, at every step. Certainly, we cannot deny the possibility that the military cost of using Persian-Gulf oil in transportation is very small -- much less, even, than our lower bound.

In principle, the uncertainty could be narrowed through a carefully specified multivariate regression, in which some measure of U.S. oil interests in the Persian Gulf,

23Note that, in a analysis of what social costs have been and will be, the relevant quantity is what we have spent or will spend on defense of the Middle East, not what we “should” spend in order to maximize net social benefits. We would want to estimate the “optimal” amount of military spending only if the military were funded in accordance with an explicit social cost benefit analysis, which of course it is not.
along with measures of other determinants of the U.S. military budget, explain the military budget over time. The challenge, of course, is to find an adequate measure of U.S. oil interests, and to identify and quantify other determinants of the military budget. We know of no such attempt. Hall (1992) does find a significant positive correlation between the value of U.S. oil imports and the U.S. military budget (with a two-year lag).\textsuperscript{24} Of course, given that his is a rather sweeping single-variable regression, one reasonably can argue that the results are spurious, or that the oil-import variable captures the effects of omitted correlated variables, or even that if there is any causality, it goes the other way (i.e., that something that is associated with an increase in military spending causes an increase in oil imports). We encourage further analytical work in this area, to help narrow the range of reasonable estimates.

\textsuperscript{24}Hall (1992) estimates a single-variate autoregressive moving-average model in which defense spending in year \( t \) depends on oil imports in year \( t-2 \). (The 2-year lag accounts for lags in the political, legislative, and budgetary processes). He uses total annual defense spending and total annual imports of crude oil and petroleum products, from 1968 to 1989. There are no other explanatory variables in the model. Hall argues that “as long as the omitted variables, such as the perceived Soviet threat, are not correlated with oil imports, a model with a single explanatory variable could result in an unbiased statistical estimate of the portion of defense spending due to imports” (p. 1093). All specifications of the model yielded the same, statistically significant (10\% level) coefficient: for every million barrels of daily oil imports, defense spending increased by \$2.67 billion (in 1982 dollars). In 1990 dollars, Hall’s result is \( 2670 \times 1.328 / 365 = \$9.71 \) of defense spending per barrel of imported oil (the 1.328 factor is the 1990/1982 implicit price deflator). In 1990, the U.S. imported 2.93 billion barrels of crude oil and petroleum products (Energy Information Administration, Annual Energy Review 1991, 1992), which according to Hall’s model would have been associated with an increase in defense spending of \( 2.93 \times 9.71 = \$28 \) billion/ year. This is within the range of estimates, cited above, that were derived by allocating the military budget.
15.5 REFERENCES


Table 15-1. Sources of Crude Oil Supplied in the United States, 1993

<table>
<thead>
<tr>
<th>Source</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Domestic Production</td>
<td>50.2%</td>
</tr>
<tr>
<td>Non-OPEC Imports a</td>
<td>22.7%</td>
</tr>
<tr>
<td>Other OPECb</td>
<td>15.0%</td>
</tr>
<tr>
<td>Persian Gulf Imports - OPECc</td>
<td>12.0%</td>
</tr>
</tbody>
</table>


^a Mexico and Canada each supply approximately 30 percent of non-OPEC imports. The United Kingdom, Norway, and Trinidad-Tobago also are major non-OPEC suppliers.

^b Nigeria and Venezuela supply about 40 percent of the oil from non-Gulf members of OPEC. Indonesia, Gabon, Ecuador and Algeria supply the rest.

^c Saudi Arabia supplies virtually all U.S. oil from the Gulf.
## Table 15-2. Deaths from Military Conflicts in the Middle East since World War II

<table>
<thead>
<tr>
<th>Region</th>
<th>Civilian</th>
<th>Military</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red Sea&lt;sup&gt;a&lt;/sup&gt;</td>
<td>966,422</td>
<td>387,805</td>
<td>1,354,227</td>
</tr>
<tr>
<td>North Africa&lt;sup&gt;b&lt;/sup&gt;</td>
<td>98,443</td>
<td>35,430</td>
<td>135,673</td>
</tr>
<tr>
<td>Persian Gulf</td>
<td>270,312</td>
<td>406,432</td>
<td>676,744</td>
</tr>
<tr>
<td>Arab-Israeli</td>
<td>109,516</td>
<td>74,533</td>
<td>184,249</td>
</tr>
<tr>
<td>Total</td>
<td>1,444,693</td>
<td>904,200</td>
<td>2,350,893</td>
</tr>
</tbody>
</table>

Source: Cordesman (1993), pages 5-8.

<sup>a</sup>Almost ninety percent of the deaths in the Red Sea region were the result of struggles between Ethiopia and Sudan, as well as internal strife within these two nations.

<sup>b</sup>About three-quarters of these deaths resulted from the Algerian war of independence with France (1954-1962). The more recent conflicts have been smaller, low-intensity struggles such as the Libyan-Chad war, and the U.S. raid on Libya.
**Table 15-3. Oil-price shocks and recessions, 1947 - 1991**

<table>
<thead>
<tr>
<th>Oil Price Shocks</th>
<th>Recessions Began</th>
</tr>
</thead>
<tbody>
<tr>
<td>1947</td>
<td>1948</td>
</tr>
<tr>
<td>1953</td>
<td>1953</td>
</tr>
<tr>
<td>1957</td>
<td>1957</td>
</tr>
<tr>
<td>------</td>
<td>1960</td>
</tr>
<tr>
<td>1969</td>
<td>1969</td>
</tr>
<tr>
<td>1970</td>
<td>------</td>
</tr>
<tr>
<td>1973</td>
<td>1974</td>
</tr>
<tr>
<td>1979</td>
<td>1979</td>
</tr>
<tr>
<td>1980-1</td>
<td>1981</td>
</tr>
<tr>
<td>1990</td>
<td>1991</td>
</tr>
</tbody>
</table>


<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Military Personnel</td>
<td>78.9</td>
<td>84.2</td>
<td>81.2</td>
<td>76.0</td>
<td>70.8</td>
<td>70.5</td>
</tr>
<tr>
<td>Operations &amp; Maintenance</td>
<td>88.3</td>
<td>117.2</td>
<td>93.8</td>
<td>89.2</td>
<td>88.0</td>
<td>92.9</td>
</tr>
<tr>
<td>Procurement</td>
<td>81.4</td>
<td>71.7</td>
<td>63.0</td>
<td>52.8</td>
<td>44.5</td>
<td>43.3</td>
</tr>
<tr>
<td>Research &amp; Development</td>
<td>36.5</td>
<td>36.2</td>
<td>36.6</td>
<td>38.0</td>
<td>34.8</td>
<td>36.2</td>
</tr>
<tr>
<td>Military Construction</td>
<td>5.1</td>
<td>5.2</td>
<td>5.3</td>
<td>4.6</td>
<td>6.0</td>
<td>5.0</td>
</tr>
<tr>
<td>Family Housing</td>
<td>3.1</td>
<td>3.3</td>
<td>3.7</td>
<td>3.9</td>
<td>3.5</td>
<td>3.3</td>
</tr>
<tr>
<td>Defense-wide Contingency</td>
<td>0.6</td>
<td>2.7</td>
<td>4.6</td>
<td>4.5</td>
<td>2.2</td>
<td>1.6</td>
</tr>
<tr>
<td>Revolving and Mgmt. Funds</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trusts and Receipts</td>
<td>(0.8)</td>
<td>(44.3)</td>
<td>(5.7)</td>
<td>(0.4)</td>
<td>(0.6)</td>
<td>(0.6)</td>
</tr>
<tr>
<td>(Intragovernment Receipts)</td>
<td>0.0</td>
<td>0.0</td>
<td>(0.6)</td>
<td>(1.1)</td>
<td>(0.1)</td>
<td>(0.1)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>293.0</td>
<td>276.2</td>
<td>281.9</td>
<td>267.4</td>
<td>249.0</td>
<td>252.2</td>
</tr>
</tbody>
</table>


\(^a\) In FY1991 and FY1992, abrupt increases in budget authority, especially Operations and Management, were due to the incremental costs of Operation Desert Storm. The sharp rise in receipts reflects offsetting allied contributions.
**Table 15-5. Original Estimates of U.S. Military Expenditures in the Middle East**

<table>
<thead>
<tr>
<th>Author (year)</th>
<th>Estimate (Billion Dollars)</th>
<th>Year of Est. Exp.</th>
<th>Year of $$</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kaufmann and Steinbruner (1991)</td>
<td>$64.5</td>
<td>FY1990</td>
<td>1992</td>
<td>Allocates budget to various “force planning contingencies,” including defense of the Middle East.</td>
</tr>
<tr>
<td>US Government Accounting Office (GAO), (1991)</td>
<td>$4.7 for SW Asia specific missions ($0.5 per year)</td>
<td>Total for FY1980 - FY1990</td>
<td>1990</td>
<td>Uses incremental cost approach, which includes only programs that would not exist (in the short run) without the SW Asia mission.</td>
</tr>
<tr>
<td>Moreland (1985)</td>
<td>$54</td>
<td></td>
<td></td>
<td>Uses a CIA methodology to attribute costs; cited in Sabonis-Chafee (1987)</td>
</tr>
</tbody>
</table>
### Table 15-6. Estimates of U.S. Military Expenditures in the Middle East: Source Unknown or Literature Review

<table>
<thead>
<tr>
<th>Author (year)</th>
<th>Estimate (Billion Dollars)</th>
<th>Year of Est.</th>
<th>Year of $$</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lehman (ex-Secretary of the Navy) (Newsweek, 1987)</td>
<td>$40</td>
<td></td>
<td></td>
<td>source unknown</td>
</tr>
<tr>
<td>Romm &amp; Lovins (1992)</td>
<td>$50</td>
<td></td>
<td></td>
<td>source unknown</td>
</tr>
<tr>
<td>Hubbard (1991)</td>
<td>$15 to $54</td>
<td></td>
<td></td>
<td>literature review - sources unknown</td>
</tr>
<tr>
<td>Carpenter and Fiscarelli (1990)</td>
<td>$40</td>
<td>1985</td>
<td>1985</td>
<td>Decreased Ravenal’s (1984) figure slightly to account for the fact that CENTCOM has a commitment to NATO, in addition to the Gulf.(^a)</td>
</tr>
<tr>
<td>Tonelson (1990)</td>
<td>$40 to $45</td>
<td>1990</td>
<td>1990</td>
<td>Based on literature review of Lehman (Newsweek, 1987), Ravenal (1984), and others(^b)</td>
</tr>
</tbody>
</table>

\(^a\) Personal communication with Ted Galen Carpenter on August 31, 1994.

\(^b\) Personal communication with Alan Tonelson in July 1994.

<table>
<thead>
<tr>
<th>Force Planning Contingency</th>
<th>Budget Authority</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-Nuclear Defense of:</td>
<td></td>
</tr>
<tr>
<td>Middle East / Persian Gulf</td>
<td>64.5</td>
</tr>
<tr>
<td>All other regions</td>
<td>182.2</td>
</tr>
<tr>
<td>Subtotal Non-nuclear Defense</td>
<td>246.7</td>
</tr>
<tr>
<td>Nuclear Deterrence</td>
<td></td>
</tr>
<tr>
<td>Strategic Nuclear Deterrence</td>
<td>48.2</td>
</tr>
<tr>
<td>Tactical Nuclear Deterrence</td>
<td>2.4</td>
</tr>
<tr>
<td>Subtotal Nuclear Deterrence</td>
<td>50.6</td>
</tr>
<tr>
<td>National Intelligence &amp; Communications</td>
<td>19.2</td>
</tr>
<tr>
<td><strong>Total Budget Authority</strong></td>
<td><strong>316.5</strong></td>
</tr>
</tbody>
</table>
Table 15-8. GAO (1991) estimates of costs related to Southwest Asia interests Fiscal Years 1980 to 1990 (billion $)

<table>
<thead>
<tr>
<th>Program</th>
<th>Total cost $</th>
<th>Cost assigned to SW Asia $</th>
</tr>
</thead>
<tbody>
<tr>
<td>Military Expenditures</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SW Asia “Dedicated” programs</td>
<td>21.4</td>
<td>4.5</td>
</tr>
<tr>
<td>SW Asia “Oriented” programs</td>
<td>5.8</td>
<td>0.0</td>
</tr>
<tr>
<td>Contingency and mobility programs</td>
<td>272.6</td>
<td>0.0</td>
</tr>
<tr>
<td>Operation Earnest Will</td>
<td>0.2</td>
<td>0.2</td>
</tr>
<tr>
<td>Sub-total military expenditures</td>
<td>300.0</td>
<td>4.7</td>
</tr>
<tr>
<td>Other Assistance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Military Assistance</td>
<td>30.8</td>
<td>30.8</td>
</tr>
<tr>
<td>Economic Assistance</td>
<td>28.3</td>
<td>28.3</td>
</tr>
<tr>
<td>Multilateral Assistance</td>
<td>6.6</td>
<td>6.6</td>
</tr>
<tr>
<td>Aid for Petroleum Activities</td>
<td>0.5</td>
<td>0.5</td>
</tr>
<tr>
<td>Sub-total assistance</td>
<td>66.2</td>
<td>66.2</td>
</tr>
<tr>
<td>Total</td>
<td>366.2</td>
<td>70.9</td>
</tr>
</tbody>
</table>

Source: adapted from GAO (1991). Note that these are costs over a 10-year period.

aThe total cost of the entire program or mission named in the column to the left. This total cost includes objectives or functions that the DOE claims would continue to be funded independent of U.S. interests in SW Asia.

bThese are expenditures that pertain only to the mission of protecting U.S. interests in SW Asia. This is the amount that, according to the DoD, would not be spent if the U.S. had no interest in SW Asia.

cThe DoD terminology here is confusing. Most of these programs actually are dedicated to SW Asia, in the normal sense of “dedicated,” but two programs -- the pre-positioned force at Diego Garcia ($0.8 billion), and carrier battle group in the Indian Ocean ($16.1 billion) -- are not, and according to DoD would continue to be spent in the absence of a mission in SW Asia.

dPrograms which were created in part to defend U.S. interests in SW Asia, and in part to meet military objectives in other regions. According to the DoD, all of these programs would
continue to be funded, even in the absence of a mission in SW Asia, because they are needed for contingencies in other regions.

Reflagging Kuwaiti tankers during Iran-Iraq War.
TABLE 15-9. UNITED STATES FOREIGN ASSISTANCE TO THE MIDDLE EAST IN FISCAL YEAR 1992 (MILLION $)

<table>
<thead>
<tr>
<th>Country</th>
<th>Economic a</th>
<th>Military b</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Loans</td>
<td>Grants</td>
<td>Loans</td>
</tr>
<tr>
<td>Israel</td>
<td>0</td>
<td>1,200</td>
<td>0</td>
</tr>
<tr>
<td>Egypt</td>
<td>40</td>
<td>893</td>
<td>0</td>
</tr>
<tr>
<td>Turkey</td>
<td>0</td>
<td>1</td>
<td>25</td>
</tr>
<tr>
<td>Morocco</td>
<td>45</td>
<td>46</td>
<td>0</td>
</tr>
<tr>
<td>Oman</td>
<td>0</td>
<td>30</td>
<td>0</td>
</tr>
<tr>
<td>Greece</td>
<td>0</td>
<td>0</td>
<td>32</td>
</tr>
<tr>
<td>Jordan</td>
<td>20</td>
<td>9</td>
<td>0</td>
</tr>
<tr>
<td>Pakistan</td>
<td>0</td>
<td>19</td>
<td>0</td>
</tr>
<tr>
<td>Lebanon</td>
<td>0</td>
<td>16</td>
<td>0</td>
</tr>
<tr>
<td>Tunisia</td>
<td>15</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>Iraq</td>
<td>0</td>
<td>8</td>
<td>0</td>
</tr>
<tr>
<td>West Bank / Gaza</td>
<td>0</td>
<td>8</td>
<td>0</td>
</tr>
<tr>
<td>Yemen Arab Republic</td>
<td>0</td>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>Algeria</td>
<td>0</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Bahrain</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Iran</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Kuwait</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Saudi Arabia</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Syria</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Yemen, PDR</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td><strong>120</strong></td>
<td><strong>2,244</strong></td>
<td><strong>57</strong></td>
</tr>
<tr>
<td><strong>U.S. Assistance, Middle East</strong></td>
<td><strong>120</strong></td>
<td><strong>2,244</strong></td>
<td><strong>57</strong></td>
</tr>
<tr>
<td><strong>U.S. Assistance, World</strong></td>
<td><strong>494</strong></td>
<td><strong>10,748</strong></td>
<td><strong>57</strong></td>
</tr>
<tr>
<td>Middle East Assistance as Percent of World Total</td>
<td>24%</td>
<td>21%</td>
<td>100%</td>
</tr>
</tbody>
</table>


aIncludes U.S.A.I.D, Food for Peace, Peace Corps, contributions to international lending organizations, and other economic programs.

bIncludes Military Assistance Program Grants, Foreign Military Sales Credit Financing, Transfers from Excess Defense Stocks, International Military Education and Training Programs, and other military programs.
Throughout the 1980's, Pakistan received substantial amounts of U.S. aid. However, aid to Pakistan has been dramatically reduced since 1991.
### Table 15-10. Our Estimate of the Military Cost of Using Oil in Transportation (Billion Dollars per Year, Recent Years)

<table>
<thead>
<tr>
<th>U.S. military costs that could be saved if:</th>
<th>Low</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td>• There was no Persian Gulf</td>
<td>20.0</td>
<td>40.0</td>
</tr>
<tr>
<td>• There was no oil in the Persian Gulf&lt;sup&gt;a&lt;/sup&gt;</td>
<td>10.0</td>
<td>30.0</td>
</tr>
<tr>
<td>• The U.S. did not produce or consume Persian-Gulf oil&lt;sup&gt;b&lt;/sup&gt;</td>
<td>5.0</td>
<td>15.0</td>
</tr>
<tr>
<td>• The U.S. produced but did not consume Persian-Gulf oil&lt;sup&gt;c&lt;/sup&gt;</td>
<td>2.5</td>
<td>10.0</td>
</tr>
<tr>
<td>• Motor vehicles in the U.S. did not consume any oil&lt;sup&gt;d&lt;/sup&gt;</td>
<td>0.6</td>
<td>7.0</td>
</tr>
</tbody>
</table>

**Allocation of the total to six classes of motor vehicles:<sup>e</sup>**

<table>
<thead>
<tr>
<th></th>
<th>Low</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gasoline light-duty autos</td>
<td>0.3</td>
<td>3.7</td>
</tr>
<tr>
<td>Gasoline light-duty trucks</td>
<td>0.1</td>
<td>1.5</td>
</tr>
<tr>
<td>Gasoline heavy-duty vehicles</td>
<td>0.0</td>
<td>0.2</td>
</tr>
<tr>
<td>Diesel light-duty autos</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Diesel light-duty trucks</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Diesel heavy-duty vehicles</td>
<td>0.1</td>
<td>1.5</td>
</tr>
</tbody>
</table>

**Source:** See text for details. The estimates are not additive or cumulative, but rather sequential or hierarchical. They estimates do not include the cost of occasional wars in the Gulf, such as the 1991 Gulf War, or the cost of defending oil interests in other regions. We emphasize that our “analysis” here is illustrative, and almost purely judgmental.

<sup>a</sup>The difference between this line and the previous line is the cost of defending interests other than oil in the Persian Gulf.

<sup>b</sup>The difference between this line and the previous line is the cost of defending against the possibility of a world-wide recession due to the effects of an oil price shock related to the production and use of Persian-Gulf oil by other countries. (Such a recession would harm the U.S., even if the U.S. did not produce or consume oil.)

<sup>c</sup>The difference between this line and the previous line is the cost of defending the investments of U.S. oil producers in the Persian Gulf, apart from the interests of U.S. oil consumers.

<sup>d</sup>The difference between this line and the previous line is the cost of defending the use of oil in sectors other than highway transportation. This last line is the cost of interest in this analysis.

<sup>e</sup>Estimated using the allocation factors developed in Report #10.
**Table 15-11. Two estimates of feasibly reduced military expenditures in the Persian Gulf**

<table>
<thead>
<tr>
<th>Author (year)</th>
<th>Estimate (billion $)</th>
<th>Year of est.</th>
<th>Year of $$</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kaufmann and Steinbruner (1991)</td>
<td>$29 to $45</td>
<td>FY2001</td>
<td>1992</td>
<td>Feasible budgets resulting from careful reductions in spending source unknown</td>
</tr>
<tr>
<td>Carpenter and Fiscarelli (1990)(^a)</td>
<td>$10</td>
<td>FY1995</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\(^a\)This paper was written before the 1991 Gulf War, and does not anticipate U.S. involvement in such regional conflicts.
FIGURE 15-1. MONTHLY CRUDE OIL PRICES 1990-1991 ($/barrel)

Note: The refiner acquisition price of crude oil includes all transportation costs and fees up to the time the oil is booked into the refinery. The composite price is an average of prices for domestic and imported oil.