

How Secure Are Middle East Oil Supplies?

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1. Introduction

During the 1980s and 1990s, energy security declined in importance as oil prices fell and spare capacity stood at high levels. This was reversed in the decade that followed and once more energy security became a priority in policy agendas of most oil-importing countries. High oil prices, threats of terrorist attacks, instability in many oil-exporting countries and the rise in so-called ‘oil nationalism’ have raised serious concerns about the security of oil supplies. In the background, there are fears that the world may be running out of oil with many observers predicting an imminent oil supply crunch (Campbell and Laherrère, 1998) and raising doubts about the size of proven oil reserves in the Middle East and elsewhere (Simmons, 2005). These doom-laden predictions about the availability of oil supplies and the size of reserves are gaining popular credence at times when oil market conditions are tight. Many international agencies, such as the Energy Information Administration (EIA) and International Energy Agency (IEA), are also predicting a healthy growth in global oil demand in the next 20–25 years, driven primarily by high growth rates of non-OECD Asian economies.¹

Given that the Middle East is endowed with the bulk of the world’s oil reserves and is responsible for a large share of global oil production, security of Middle East oil supplies is central to the oil security debate. In fact, some analysts consider that the most important facet of energy security is “limiting vulnerability to disruption given rising dependence on imported oil from an unstable Middle East” (Martin *et al.*, 1996). Others equate the improvement of energy security with reducing dependency on Middle East oil. In his State of the Union Address in 2004 (<http://news.bbc.co.uk/1/hi/world/americas/4668628.stm>), US President George Bush declared that “America is addicted to oil, which is often imported from unstable parts of the world” and that breakthroughs in technology will help the US “reach another great goal: to replace more than 75% of our oil imports from the Middle East by 2025”.

The fact that high dependence on Middle East oil creates serious grounds for concern should come as no surprise. The region has experienced a relatively large amount of disruption, some causing large losses of supplies such as that which followed the Iraqi invasion of Kuwait resulting in a cumulative loss of 420 million barrels during the period 1990–1991 (see Table 1). The region has witnessed wars, civil conflicts, invasions, revolutions and terrorist acts. This list is usually widened to include potential sources of instability such as the unresolved Palestinian question and the Arab–Israel conflict, the rise of anti-US feelings in the region (Sweig, 2006; Regan, 2007), the revival of Shi’a Islamism (e.g. Allaf *et al.*, 2004; Nasr, 2006a, 2006b; alternatively, for a sceptical view of Shi’a revival see Terhalle, 2007); the rise of radical Islamism (e.g. Mazarr, in press), the threat from al-Qaeda that has recently “risen from the grave” (Hoffman, 2007), the possible emergence of Iran as a nuclear power, the instability of political regimes and the problem of youth unemployment in many Gulf States (e.g. Byman and Green, 1999).

¹ The International Energy Outlook, 2007, predicts world consumption of petroleum products and other liquid fuels to increase from 83 million barrels per day (mb/d) in 2004 to 97 mb/d in 2015 and 118 mb/d in 2030 with two-thirds of this increment to be used in the transport sector. These increases would be driven mainly by US and non-OECD Asia (EIA, 2007).

Table 1. Global oil disruptions caused by events in the Middle East (1951–2004)

Date of oil supply disruption	Duration (months)	Average gross shortfall (mb/d)	Reason for oil supply disruption
03/1951–10/1954	44	0.7	Iranian oil fields nationalized May 1 following months of unrest and strikes in Abadan areas
11/1956–03/1957	4	2.0	Suez War
12/1966–03/1967	3	0.7	Syrian transit fee dispute
06/1967–08/1967	2	2.0	Six Day War
05/1970–01/1971	9	1.3	Libyan price controversy; damage to tapline
04/1971–08/1971	5	0.6	Algerian–French nationalization struggle
03/1973–05/1973	2	0.5	Unrest in Lebanon; damage to transit facilities
10/1973–03/1974	6	2.6	October Arab–Israeli War; Arab oil embargo
04/1976–05/1976	2	0.3	Civil war in Lebanon; disruption to Iraqi exports
05/1977	1	0.7	Damage to Saudi oil field
11/1978–04/1979	6	3.5	Iranian Revolution
10/1980–12/1980	3	3.3	Outbreak of Iran–Iraq war
1990–1991		420 ^a	Gulf Crisis
03/2003–09/2004	Continuing	1.0	Iraq war and continued unrest

^a Cumulative effect

Sources: EIA; Horsnell (2000)

Despite these various potential sources of instability, it has not been all bad news when it comes to the security of Middle East oil supplies. The Middle East and in particular the Gulf States continue to act as the main supplier of oil to global markets. In many instances the region has played the role of a swing producer, absorbing supply shocks from within and outside the region. For example, the large loss of oil caused by the Iraqi–Kuwait invasion was filled by the available spare capacity in Saudi Arabia. Recently, some Gulf States (especially Saudi Arabia) have invested heavily in their upstream sector with the aim of increasing their productive capacity (Fattouh, 2007a). Finally, if one examines the more recent history, the major oil disruptions in the last decade originated from OPEC members outside the Middle East and elsewhere in the world (the exception is US invasion of Iraq in 2003, see Table 2). The region did not witness any civil unrests or strikes such as those in Venezuela, successful militant attacks on oil installations as in Nigeria or tensed relations with importing countries as in the case of Russia. Furthermore, the region did not experience any major disruption due to technical failures, hurricanes or weather-related events. Despite this robust performance, there is unease and sometimes a sense of mistrust in relying on Middle East oil. It is very unfortunate that the oil security agenda is still driven by the events surrounding the 1973 oil shock and the embargo imposed by Arab countries, despite the facts that the oil cuts were for a short duration and that this event represents an exception rather than the rule in the long history of oil.

Table 2. Global oil disruptions 2000–2007

Apr 5, 2002	Thousands of workers at Venezuelan state oil company PdVSA stay at home, close gates of facilities and engage in protests.
Apr 8, 2002	Iraq announces that it will halt its “oil-for-food” exports for 30 days as a gesture of support for the Palestinians’ struggle with Israel.
Apr 9, 2002	A general strike begins in Venezuela, shutting down many stores and factories and almost halting oil production, refining and export terminals.
Oct 3, 2002	Hurricane Lili makes landfall on the US Gulf coast after passing through offshore hydrocarbon production areas and the Louisiana Offshore Oil Port (LOOP). Nearly all offshore production (about 1.5 mb/d of oil production) as well as some onshore refineries are shut down.
Oct 6, 2002	A French oil tanker chartered by Malaysian state oil company Petronas is attacked off the coast of Yemen, seriously damaging the ship and killing one crew member. The VLCC, with about 400 000 barrels of oil aboard, catches fire.
Mar 19, 2003	Military action in Iraq commences with a bombing raid and missile attack on targets in the Iraqi capital of Baghdad.
Dec 2, 2003	Business and labour groups in Venezuela, including employees of state-oil company PdVSA, begin a strike in order to obtain an early referendum on the rule of Venezuelan President Hugo Chávez.
Mar 23, 2004	Outbreaks of violence between soldiers and militants of various ethnic groups in the Niger Delta region of Nigeria prompt three major oil companies operating in the region to shut operations in the area, totalling about 800 000 bbl/d.
Jun 12, 2004	Two explosions damage the Kirkuk-Ceyhan oil pipeline, in what is later determined to be an act of sabotage. Several other Iraqi pipelines are damaged in acts of sabotage throughout the month.
Aug 15, 2004	Iraq’s crucial northern oil pipeline from Kirkuk to the Turkish port of Ceyhan is attacked, stopping flows on the line just two days after it reopened for the first time since the war.
Apr 21, 2004	A car bomb explodes outside a police building in Riyadh, Saudi Arabia, marking the first major attack by militants on governmental targets in the Kingdom.
May 30, 2004	Saudi militants attack a complex in Khobar, Saudi Arabia, housing foreign workers.
Sep 14, 2004	Hurricane Ivan forces Shell Oil Co., ChevronTexaco, ExxonMobil and Total to shut some hundreds of thousands of barrels per day of Gulf of Mexico oil production as the companies evacuate more than 3000 workers from the offshore platforms.
Nov 2, 2004	Saboteurs mount a large attack on Iraq’s oil infrastructure by blowing up three pipelines in the north, halting exports at the Turkish port of Ceyhan.
Dec 5, 2004	Around 300 unarmed Nigerian villagers – including women and children – from the Kula community in Rivers State in the Southern Niger Delta, seize three oil flow stations operated by multinational oil companies Shell and ChevronTexaco, shutting in 100 000 barrels per day (bbl/d) of production for one week.
Mar 1, 2005	Iraq closes its northern crude oil export pipeline indefinitely due to sabotage concerns. The 600 000 bbl/d-pipeline, which runs from the city of Kirkuk to the Mediterranean port of Ceyhan was the target of over 15 attacks from January 2005.
Mar 24, 2005	An explosion at BP’s Texas City oil refinery kills 15 people and injures more than 70.
May 20, 2005	A strike in France shuts down five of six oil refineries operated by international oil major Total.
Jul 5, 2005	Tropical storm Cindy disrupts oil and natural gas production in the US Gulf of Mexico (GOM) region. The storm shuts-in oil and gas platforms and forces the closure of the Louisiana Offshore Oil Port, the largest US oil import terminal. Cindy also causes some oil refineries in the region to cease operations.
Jul 8, 2005	A strike by local workers at Angola’s Block 0 offshore oil project shuts-in almost all production at the project.
Jul 11, 2005	Hurricane Dennis causes serious damage to the Thunder Horse project, a semi-submersible platform under development by BP.
Jul 19, 2005	Hurricane Emily shuts in most of Mexico’s offshore oil production in the Gulf of Mexico region.
Aug 5, 2005	BP shuts-in production at its 120 000 bbl/d Shiehallion oil field in the UK Sector of the North Sea due to a fire in the staff facilities. The fire is representative of the kinds of problems that impair North Sea oil production in early August 2005, with unplanned outages cutting

	production from the area by more than 250 000 bbl/d at one point.
Aug 15, 2005	Protests in Ecuador's northeast, oil-producing provinces shut in much of the country's crude oil production.
Aug 28, 2005	Hurricane Katrina strikes the US Gulf of Mexico (GOM) region near New Orleans, severely impacting oil and natural gas production there.
Sept 24, 2005	Hurricane Rita makes landfall along the US Gulf Coast. Energy companies operating in the region had shut in almost all oil and natural gas production in anticipation of the storm. Refiners also had shut in over 3.9 mb/d of refining capacity, which, along with the refining capacity already shut down due to damage caused by Hurricane Katrina, represents over one-quarter of total US capacity.
Sept 27, 2005	A strike at the largest oil refinery in France, Total's facility at Gonfreville, shuts-in 343 000 bbl/d of refining capacity in that country.
Oct 21, 2005	A strike by workers at Nigeria's Brass River crude oil export terminal shuts operations at the facility for two days.
Oct 31, 2005	Workers at Royal Dutch Shell's Pernis refinery begin a phased shutdown of the facility, as part of a labour dispute with the company.
Dec 14, 2005	Oil tankers transiting the Bosphorus Straits face delays of 19 days, more than twice the delay faced at the same time in the previous year. Poor weather and increased tanker traffic cause the increase.
Dec 20, 2005	Militants in Nigeria's Niger Delta bomb a crude oil pipeline in two different locations. The bombings kill sixteen people and start a large fire. As a result of the incident, Royal Dutch Shell shuts in 180 000 bbl/d of crude oil production and declares <i>force majeure</i> on its crude oil exports from the country
Jan 11, 2006	A series of incidents in Nigeria leads to the shutting in of 220 000 bbl/d of crude oil production.
Feb 9, 2006	Protesters in Ecuador shut down all crude oil production operated by state-owned Petroecuador.
Feb 21, 2006	Royal Dutch Shell extends the <i>force majeure</i> on its crude oil exports from Nigeria. The company has shut in 455 000 bbl/d of crude oil production in the country due to conflict in the oil-producing Niger Delta region.
Feb 24, 2006	Militants in Saudi Arabia try to attack the Abqaiq oil processing terminal with three truck bombs. Security forces are able to repel the attackers, before they penetrate into the core of the facility.
Mar 2, 2006	Workers at the Prudhoe Bay oil field in Alaska discover a leak in a pipeline, forcing field operator BP to shut-in 100 000 bbl/d of crude oil production.
Apr 30, 2006	A fire at the Impianti Nord refinery in Sicily, Italy closes the 160 000 bbl/d facility.
Jun 1, 2006	A fire damages the Khor al-Amaya oil export terminal in Iraq, forcing it to close.
Jun 21, 2006	Oil services workers in Norway strike, which has a limited impact on oil production.
Jul 19, 2006	Renewed attacks on Iraq's northern pipeline block the country's crude oil exports from its Kirkuk fields, which are routed through Ceyhan, Turkey.
Jul 24, 2006	A leak at a Royal Dutch Shell-operated pipeline in Nigeria shuts in 180 000 bbl/d of crude oil production, forcing the company to declare <i>force majeure</i> on its Bonny Light August loadings.
Aug 7, 2006	UK-based oil and gas major BP announces that it will shut in production at the 400 000 bbl/d Prudhoe Bay oil field in Alaska, following the discovery of leaks on a transit pipeline feeding the main Trans-Alaska Pipeline System (TAPS).
Nov 27, 2006	A mortar attack strikes one of two crude oil processing plants at Iraq's Kirkuk field, cutting output at the field to 100 000 bbl/d from 300 000 bbl/d.
Jan 3, 2007	Russia halts crude oil exports to Belarus through the Druzhba pipeline after Belarus demands a \$6 per barrel tax to transit Russian oil.

Source: EIA

In light of the Middle East's record as a reliable supplier, the argument that consuming countries should reduce dependency on Middle East oil may prove unrealistic, costly and counter-productive. In this paper, we argue that a more useful approach is to assess under which circumstances the region would cease to act (willingly or unwillingly) as a reliable supplier, the chances of these events occurring

and, in the event of a disruption, how big the impact is likely to be on oil supplies and productive capacity. This approach would help refocus the debate regarding Middle East supplies by reconsidering certain concerns that seem to shape energy security policies. On the other hand, one can identify some factors that may have a long-lasting impact on energy security but which do not receive the appropriate attention.

2. Oil Security and Dependency on Middle East Oil Supplies

Unlike the 1970s when oil dominated the energy policy debate, the concept of energy security has broadened to include the security of other sources of energy such as gas and electricity (Yergin, 2006). In this respect, oil is by far the most tradable fuel and therefore presents fewer problems in terms of security when compared to other less tradable fuels. Energy security has also become intertwined with environmental concerns which place restrictions on the choice of future fuels.² Despite these new aspects of energy security, oil still occupies a central location in the policy debate. This is expected, since although the importance of oil as a percentage of GDP has declined in most developed countries in the last thirty years, it still constitutes the world's most important source of energy.

According to the 2007 BP statistical review, oil constituted around 37% of global energy consumption in 2006 followed by coal (27%) and natural gas (24%). Furthermore, the transport and aviation sectors, the lifelines of any modern economy, are still totally reliant on oil where no other fuels have been able to make progress. Around 98% of the energy used for road and air transport (the dominant forms of transport) is based on fuels derived from oil (Appert and Pinchon, 2006). Given the dominant position of oil in the world's economy, it is also widely believed that high and volatile oil prices can have damaging effects on economic growth with many studies showing that oil price shocks have preceded most recessions in the US and OECD (Jones *et al.*, 2004). Furthermore, high oil prices can induce global imbalances, especially for developing countries (IMF, 2006). Thus, unlike other commodities, securing oil supplies and avoiding oil price shocks are essential for an efficient and smoothly-functioning global economy.

At the root of oil security concerns is the concept of 'oil dependency'. Due to a geological accident, oil is found and extracted in different regions from those in which it is mostly consumed. A small group of countries, predominately in the Middle East, are endowed with the bulk of the world's oil reserves and are responsible for a large share of global oil production. According to the 2007 BP Statistical Review, in 2006 the Middle East was responsible for 31.2% of global oil production and around 61.5% of the world's proven reserves. On the other hand, global oil consumption is dominated by the US, the European Union, Japan and China. In 2006, these were responsible for around 57% of world consumption; the US accounts for almost a quarter of global oil consumption. Although some of these countries are important oil producers, domestic production accounts for about one-quarter of their consumption and consequently these countries have to rely on oil imports to fill the gap. Trade movements in 2006 indicate that the Middle East exported more than 20 mb/d, while Europe, Japan and the US imported more than 32 mb/d. Oil dependency is likely to increase in the future for North America, Europe and Asia as they possess less than 10% of the world's proven reserves.

Dependency, however, is not a sufficient condition to elicit concerns about energy security. Relying on oil imports would not constitute a source of concern if oil continues to flow smoothly from surplus to deficit areas. Thus, in addition to oil

² The authors of the report to the Trilateral Commission (Martin *et al.*, 1996) point out that a new face of energy security is "the energy-related environmental challenge. The international energy system needs to operate within the constraints of sustainable development-constraints which, however uncertain and long term, have gained considerable salience in the energy policy debates in our countries" (p. 4).

dependency, an underlying theme is that the regular flow of oil to importing nations may be subject to disruptions. This conjunction of the concepts of oil dependency and vulnerability to serious disruptions in oil supplies constitutes the basis for energy security concerns. This is reflected in widely-used definitions of energy security. Yergin (2006) defines it as the “availability of sufficient supplies at affordable prices”. Kalicki and Goldwin (2005) similarly define energy security in terms of “provision of affordable, reliable, diverse and ample supplies of oil and gas and their future equivalents and adequate infrastructure to deliver these supplies to market” (p. 9).

It is interesting to note that in addition to disruption, these definitions incorporate the concept of ‘affordable prices’. This concept of affordability is, however, very ambiguous as affordability tends to vary widely across countries: what is affordable to one country may not be affordable to another. Furthermore, the above definitions are biased in the sense that they only consider energy security from the oil importers’ perspective. Very low oil prices, which are affordable to consuming countries, may undermine the energy security of oil-exporting countries since oil revenues represent the main source of income for these countries. Thus, from a producer perspective, low oil prices constitute a major threat to their security.

In this paper, energy security is analysed in terms of potential factors or events that disrupt the flow of oil through the supply chain without any consideration to affordability. It is important to stress the following features of our definition. First, there are many causes of disruption. Disruptions can be caused by technical failure, weather-related events such as hurricanes and storms, strikes, terrorist attacks on oil facilities, wars and civil strife, regime change that may restrict the capability of a country to export and a deliberate restriction of exports. The dynamics of supply and demand in the oil market may also result in market dislocations with considerable impact on oil supplies. In the worst possible scenario, global oil supply falls short of global oil demand due to a lack of investment or peak oil (Horsnell, 2000). Furthermore, the oil market can experience a reduction in available supplies due to a change in the policy of exporters.

Second, disruptions and dislocations can occur at any segment of the supply chain. The supply chain from the resource holder to the end user is very long and includes refining, international and local transportation, storage and delivery facilities.

Finally, the impact of disruptions is not uniform. Some disruptions, such as those caused by technical failures, occur often but have limited impact on global oil supplies and productive capacity. Disruptions, such as those due to natural disasters, occur infrequently but their impact on oil supplies can be significant in the short to medium term. Some disruptions are less regular, but their impact might have both short-term effects on oil supplies and long-term effects on productive capacity.³

The discussion above shows that the realm of energy security can be very broad given the many factors that can cause shortfalls in oil supplies, the different impact that disruptions and dislocations may have on oil supplies and investment, the facts that some of these disruptions may originate in consuming nations and that energy security applies to the entire supply chain. To focus the discussion, we now concentrate on

³ Table 2 demonstrates how, during the last few years, general strikes and oil workers’ strikes were responsible for many disruptions in the oil supply chain. Oil strikes in oil-exporting countries may have adverse consequences on long-term productive capacity. For instance, many observers note that Venezuela has never been able to restore its productive capacity to its pre-strike level.

those events which may undermine the security of Middle East crude oil supplies, namely the geopolitical factors, the under-investment issue and the change in oil policy of exporters.

3. Geopolitics, Energy Security and the Middle East

Although disruptions may occur at any segment of the oil supply chain due to a wide range of factors, it is the politically-driven threats to oil supplies that have dominated the energy security debate and the imagination of policy makers. In this debate, the Middle East features prominently. The reliance on Middle East imports still raises a number of concerns.

First, there are fears that oil-exporting countries from the region could be hit by wars or internal conflicts. Second, there are fears that these countries may witness long periods of instability that could cripple their oil industry. The sources of instability are various but the main focus is usually on the growing anti-Western feelings and the rise of Islamic radicalism. It is argued that the rise of Islamic radicalism would eventually bring Islamist regimes to power that may intentionally decide to restrict oil supplies to the West. Third, there are fears that terrorist networks will succeed in hitting oil installations and pipelines. Fourth, there are concerns that some countries in the region may be tempted to use the oil weapon and restrict trade routes to force importing nations to yield political concessions. Finally, there are concerns that the West may react to political developments in the Middle East by imposing sanctions on some oil exporters.⁴ We shall explore each of these in detail.

3.1 Wars and conflicts

In the last 50 years or so, the Middle East has witnessed many devastating wars: the 1956 Suez Canal war; the 1967 and 1973 Arab–Israeli wars; the Iran–Iraq war in the 1980s; the Iraqi invasion of Kuwait in 1990; and most recently the US and British invasion of Iraq.

Notwithstanding the ongoing violence in Iraq, some of the conflicts that have engulfed the region are not likely to re-emerge any time soon. For instance, state-to-state warfare between Arab countries and Israel is high unlikely given that neighbouring countries Egypt and Jordan have signed peace agreements with Israel. Syria, another neighbouring country, has not concluded a peace deal with Israel yet, but it considers peace as its strategic priority⁵. Although the tension between Iran and Israel is likely to continue, it is unlikely to escalate into a regional full-scale war. Most probably these two countries would engage in proxy conflicts such as the Hizbullah–Israeli war in the summer of 2006. Iran’s nuclear ambitions could present serious challenges for other countries in the region (Mattair, 2007), especially the Gulf States, but it is highly unlikely that any of these states would contemplate waging a war against Iran in the manner of Saddam Hussein in the 1980s, or have the ability to do so.

⁴ Similarly, Cordesman and Al-Rodhan (2005) identify the following key geopolitical uncertainties: stability of oil-exporting nations; terrorism in the Gulf and oil facilities security; embargos and sanctions; ethnic conflict and strife. They also include proliferation of WMD, which is not discussed here.

⁵ Syria has on many occasions expressed willingness to engage in peace negotiations with Israel. For example, in her visit to Syria, Nancy Pelosi declared that the Syrian president Mr Assad was ready to “resume the peace process” (Pratfall in Damascus: Nancy Pelosi’s foolish shuttle diplomacy. *Washington Times*, April 5 2007). More recently, the Syrian Vice-President Faruq al-Shara announced that “Syria is looking at all the options, but its priority is peace”. However, it seems that any peace agreement will have to wait (Zunes, 2007).

However, other types of conflicts could emerge. A direct US–Iran confrontation cannot be ruled out. The Sunni–Shi’a tension in Iraq could spread to other parts of the region. The Palestinian and Israeli conflict has taken a turning point with the Hamas control of the Gaza strip and with the sharp divisions within the Palestinian camp. The possible emergence of an independent Kurdish state could have serious implication within Turkey and its future role in the region. The risk that the region may witness some sort of disturbance therefore remains high.

The impact of wars and civil conflicts on oil supplies is twofold. First, it usually results in medium- to long-term supply losses as it reduces the ability of the country to produce and export oil. Second, it affects the long-term productive capacity of countries by hindering investment. The US invasion of Iraq is a prime example of these impacts. In 2003 many oil experts, both Iraqi and non-Iraqi, expected that production would return to its pre-Kuwait invasion level of 3.5 mb/d one or two years after the Baathist regime had been overthrown. Other more optimistic observers projected that “a totally rehabilitated and sanctions-free Iraq” could increase its production capacity ‘beyond’ 8 mb/d (Chalabi, 2000), competing with or even replacing Saudi Arabia’s prominent position in the oil industry. The reality, however, has been quite different. Four years after the invasion, the security situation is yet to be stabilized and Iraqi oil production has not exceeded 2.2 mb/d with exports not exceeding 1.6 mb/d. The best scenario now is one in which Iraq maintains its current production of 2–2.2 mb/d.

In 2003, the US and UK occupying forces abolished the army and the police without providing a substitute to restore security and enforce law and order. The impact on the oil industry of the lack of security has been devastating. Iraqi oil industry has suffered from continuous sabotage of oil installation and pipelines, reducing the ability of Iraq to export its crude oil; the kidnap and killing of oil engineers, technicians and employees resulting in the loss of human capital needed to run the industry; and the smuggling of crude oil and products by militias and gangs and corruption at all levels, which has deprived the government from revenues needed for necessary maintenance and investment.⁶

The dynamics of Iraqi federal politics and uncertainties in the hydrocarbon laws are also having an impact on investment. Rather than constituting a force for cohesion, the new Iraqi Oil Law could have the opposite effect and may provoke political and sectarian tensions in the country. It has exacerbated a number of tensions over the federal versus regional control, the types of contracts awarded, the sharing of oil revenues and the formation and role of the Iraqi National oil company.

Most importantly, the future of Iraq as one entity is highly in doubt. Aspirations for Kurdish independence remain high. The borders of the Kurdish region are undefined and the incorporation of Kirkuk in Kurdistan remains one of the central platforms of the Kurdish political parties. The issue awaits a referendum (International Crisis Group, 2006, 2007a). The future of the South is also uncertain (International Crisis Group, 2007b). In 2005, the head of the Supreme Council for the Islamic Revolution in Iraq, one of the main ruling parties, called for the creation of a federal southern state. The Sunnis and the locally powerful Fadhila, which controls key oil industry jobs in Basra, oppose the creation of a Shi’ite “super-region” (Visser, 2007).

⁶ According to the Office of the Special Inspector General for Iraq Reconstruction (SIGIR), Iraq has lost a potential of \$16 billion in revenue from oil exports. Iraq is also paying in billions of dollars to import petroleum products (SIGIR, 2006).

Disagreements on federation could threaten national reconciliation efforts. Any development of Iraq's oil industry would have to await the settlement of these issues as it is not clear which authority and law would prevail in producing regions.

The Iraqi case shows that wars and civil strife do not only result in short-term loss of oil supplies but also adversely affect the long-term productive capacity by preventing maintenance and hindering investment especially if wars and civil conflicts break the social fabric of the nation.

3.2 Political instability, rise of Islamists and anti-colonial feelings

There is a general perception that governments in the region, especially in the Gulf, are highly unstable. The key question to many researchers is not whether these regimes would be toppled but "the scope of the violence of their demise and who wields the violence" (Huntington, 1968). A widely-discussed scenario is potential turmoil in Saudi Arabia (but also in other Gulf States). A common argument is that Saudi Arabia faces serious political, economic and social challenges (e.g. Doran, 2004) and that it is only a matter of time before the Saudi regime is toppled under these pressures.⁷

More recently, many observers in the West have been uneasy with the recent rise of radical Islamism, the wave of anti-West feeling and the potential impact that this might have on relations with the west if radical Islamists succeed in gaining power. The main concern is that political instability or the collapse in political regimes through military coups or social revolution can induce long-term disruptions to the oil market.

However, the fact remains that political regimes in the Middle East have maintained power and stability in the most challenging circumstances: Assad in Syria, Mubarak in Egypt, Qaddafi in Libya, Hussein in Jordan, Zain Al-Abideen Ben Ali in Tunisia and Saleh in Yemen. In the Arab-Persian Gulf, the ruling families have survived many assaults ranging from Arab nationalism to Islamic extremism. Most often, the change in power in Persian Gulf states occurs smoothly with a king or prince being replaced by another from within the close ruling family. In the rare case of *coup d'etat* such as that in Qatar, the son replaced the father, with limited effects on the functioning of the state.

It is true that the stability of these Gulf States has not been perfect. For instance, in Saudi Arabia the royal family has been challenged on more than one occasion: a coup attempt in 1960; the Juhayman revolt and the seizure of the holy mosque in 1979; sporadic protests by the Shi'a minority in the 1980s (Ibrahim, 2006); and more recently a series of terrorist attacks against government and civilian targets. Nevertheless, these events do not seem to have shaken the regime and the Al-Saud family still holds firmly onto power.⁸ By most accounts, the armed forces and the religious class remain loyal to the ruling family and so far it is difficult to see an alternative to the current regime (Herb, 1999; Ayoob, 2006). Scenarios of bloody and violent changes in political regimes in Saudi Arabia and other Gulf States which

⁷ Baer (2003) concludes his article by writing "sometime soon, one way or another, the House of Saud is coming down".

⁸ Byman and Green (1999) argue stability has been maintained by a combination of six strategies: strong security services; co-operation of potential dissidents; divide and rule strategies; ideological flexibility; token participation and accommodative diplomacy (Kostiner, 2000; Herb, 1999).

could break the social fabric of the country (Herb, 1999) and pose risk to oil exports are therefore highly improbable.

The past is not necessarily a good indication of the future and one cannot rule out the possibility that the region may witness violent regime changes. However, the focus should not be on regime instability or regime change *per se*. Instead, it should be on whether the new regime would alter existing oil policy in such a way that it engages in deliberate restriction of oil exports. While one may wish to assign a high probability for a regime change, it is reasonable to assign a low probability (or even zero probability) that the new regime would deliberately curtail oil production and exports. It is more likely that consumer nations may decide to impose an oil embargo on the country if they do not approve of the new regime in power. Similarly, even if one allows for the possibility of extreme Islamists gaining power,⁹ it is more difficult to envisage a situation in which Islamists in power will stop conducting business or trading with the west and voluntarily curtail their oil exports.

Nevertheless, any form of political instability or regime change is likely to reflect on long-term productive capacity as it may induce sanctions, social unrest, changes in the social fabric and lead to changes in the investment environment and tolerance to foreign investment. Iran is a classic example: despite a social revolution that saw the substitution of a Western-friendly regime by a very anti-Western regime, oil continued to flow from Iran to the West even at the climax of the Islamic revolution, although at half of its capacity. The reduction in Iran's oil capacity was not the result of a deliberate policy of restricting oil exports,¹⁰ but was due to a combination of factors including the Iran–Iraq war, sanctions and underinvestment due to the unattractive business environment.

3.3 Terrorist attacks on oil facilities

In the last decade, oil installations, pipelines and tankers have been subject to numerous terrorist attacks. Perhaps the most spectacular was the attack by an explosives-laden boat on the Very Large Crude Carrier (VLCC) Limburg, carrying a cargo of around 400 000 barrels of crude off the shores of Aden. Following this attack, Al-Qaeda issued a warning that this incident “was not an incidental strike at a passing tanker but...on the international oil-carrying line in the full sense of the word”. The attempt to hit the Abqaiq oil processing terminal in Saudi Arabia in 2006 provided the fuel for counterfactual scenarios in which Al-Qaeda succeeded in destroying Saudi Arabia's oil facilities with disastrous economic and social implications. Robert Baer, a former CIA Middle East officer, claimed that such a scenario “would be more economically damaging than a dirty nuclear bomb set off in midtown Manhattan or across from the White House in Lafayette Square...[and]

⁹ Doran (2002) argues that in recent history, extremist movements in the Muslim world have failed to assume power and would probably not be successful in maintaining power for a long period of time. He notes that “in the last two decades, several violent groups have challenged regimes such as those in Egypt, Syria and Algeria, but in every case the government has managed to crush, co-opt or marginalize the radicals”. He attributes this failure to the fact that radical political Islam is not a unified movement. However, he warns that “the new tactic of targeting America is designed to overcome precisely this weakness of political Islam” and that this new tactic “by tapping into the deepest emotions of the political community, smacks of brilliance, and – much to America's chagrin – will undoubtedly give political Islam a renewed burst of energy”. See also Sivan (1997).

¹⁰ In fact, rather than using the oil weapon, in the early years of the revolution Iran refused to respond to OPEC's call for output cuts, producing above its assigned quotas.

would be enough to bring the world's oil-addicted economies to their knees, America's along with them" (Luft, 2004).

Concerns that terrorist attacks can force the oil industry to its knees are, however, exaggerated. Terrorist attacks usually have temporary effects and damage is rapidly repaired. Despite the numerous threats,¹¹ only a few have been translated into attacks, highlighting the difficult logistical challenges involved in hitting oil installations. Furthermore, the degree of vulnerability is not the same across all parts of the oil supply chain. For example, it may be relatively easy to blow up a pipeline. However, the impact is minimal as attacks on pipelines usually result in limited losses. In the Saudi context, an attack on a pipeline would have no impact as there is plenty of spare capacity in the transport infrastructure which makes it straightforward to bypass the damaged pipeline. To cause large disruptions, terrorists therefore need to cause damage to key installations such as oil processing complexes, or to set oilfields ablaze. Hitting such key targets is very difficult and should not be compared to attacks on a pipeline. Given the importance of the oil industry to the Saudi economy, bottlenecks are heavily guarded. In the context of the Kingdom, one commentator notes that "over the past two years, the Saudi government has also allocated an extra \$750 million to enhance security at all of its oil facilities. At any one time, there are up to 30 000 guards protecting the Kingdom's oil infrastructure, while high technology surveillance and aircraft patrols are common at the most important facilities. Anti-aircraft installations defend key locations" (Obaid, 2004). Regardless, terrorist attacks on oil targets remain a menace to the oil market. Although their impacts are limited, terrorist acts affect the psychology of market players and tend to place a premium on oil prices.

3.4 Oil export restrictions: The oil weapon

The proponents of the oil weapon argue that the double dependence on oil and stable oil prices implies that oil exporters possess a very powerful weapon with which they can 'blackmail' oil-importing governments in order to obtain political objectives. This argument may suggest a lack of understanding of the nature of the oil market. Not only can the oil weapon prove costly for the country using it, but restricting oil exports would most often be ineffective and counterproductive.

To begin with, the oil weapon cannot be targeted against a specific country or group of countries. This is due to the nature of the market where oil is easily and widely traded. Countries that are not blacklisted can obtain oil and then redirect it to countries under the embargo. Adelman (2004) makes this point forcefully when he argues that "whether a supplier loves or hates a customer (or vice versa) does not matter because, in the world oil market, a seller cannot isolate any customer and a buyer cannot isolate any supplier. But conventional wisdom...is that Middle Eastern nations wield an 'oil weapon' that they can use to punish the United States or any other nation."

¹¹ A recent threat was made in February 2007 when a faction affiliated with al-Qaeda extended the call urging Muslim militants to attack oil facilities all over the world as "in the long run, America might be able to lessen its dependence on Middle East oil and would be satisfied with oil from Canada, Mexico, Venezuela and other new customers or double its dependence on alternative energy resources; therefore, oil interests in all regions that serve the U.S. and not only in the Middle East, should be attacked" (The Guardian, 15 February 2007).

For the oil embargo to be effective, it should therefore mean a total cutback of global oil supplies. If the loss of oil due to the embargo is counteracted by increases in supplies from somewhere else, the embargo should have a temporary effect on oil market supplies or prices. It would only benefit other producers that have the ability to fill the shortfall. Hence, the effectiveness of an oil weapon depends to a large extent on whether market conditions are tight and the ability to convince or pressure other producers to also implement supply cuts- something which is very difficult. Disagreement on oil embargos and export cuts is the norm rather than the exception. An agreement on export cuts has only occurred once in 1973, when a large group of Arab producers decided to cut exports to countries “committing aggression or participating in aggression of sovereignty of any Arab state or its territories” (Randall, 2005).

It is also worth stressing that the oil weapon is indiscriminate in the sense that it does not distinguish between friend and foe. A successful use of the oil weapon that results in the cutback of total global oil production and sharp rises in oil prices would have an adverse impact on all countries, regardless of whether they are poor or rich, a friend or an enemy. It is always possible to devise schemes to compensate friendly regimes, but this is difficult to implement in practice.

Furthermore, many argue that oil producers are highly dependent on oil revenues and hence cannot support production cutbacks for a long time. However, a successful use of the oil weapon can push prices to high levels such that the loss due to the decline in production is compensated for by the rise in total revenues. The ‘dependency on revenues’ argument for not using the oil weapon is true only in the unlikely event that the country stops exporting oil altogether. Although revenues may increase in the short run, the long-term effects can be damaging and long lasting and can undermine the interests of other oil exporters. It has been argued that “an oil shock can be a terrible experience for the industrial countries, but is not a fatal blow. As soon as they perceive the long term nature of such a shock they react, and their reaction can turn into a permanent nightmare for any producers. Any structural reaction implies not only reduction in demand, but also much more money devoted to research and development of alternative sources of energy or investment in new oil producing countries” (Maugeri, 2006, p. 262–63).

The discussion above suggests that only very extreme circumstances will push any country to use the oil weapon, and probably only with limited effects. But unfortunately, in the academic literature and the popular press, the oil weapon is portrayed as a ready tool for blackmailing the West. It is also unfortunate that some oil exporters, such as Iran, declare from time to time that they are prepared to use the oil weapon whenever faced with political confrontation.¹² Such announcements continue to cast a shadow over the oil market.

¹² Earlier this year, Hossein Kazempour Ardebili (Iran’s OPEC governor) made a similar statement declaring that “when the Americans say that military action in regard to the nuclear issue has not been put aside, Iran can also say that it will not put aside oil as a tool” (Iran says it won’t rule out using oil as a weapon. *Reuters*, June 19 2007). However, in the current context, it is very difficult to envisage a scenario in which other major Middle Eastern producers such as Saudi Arabia, UAE or Kuwait would agree to implement cuts along with Iran. Given the uneasiness of Gulf States about Iran’s nuclear ambitions and the alliance in ‘need’ between US and GCC states, it is unlikely that any of the Arab oil exporters would participate in an oil embargo against the US. Thus, any cuts would have to be implemented by Iran alone. In fact, if anything, Saudi Arabia may attempt to fill any shortfall from Iran’s cutback to mitigate the long-term impact of supply cuts on oil markets.

3.5 Closure of oil transit choke points

The use of the oil weapon can also take the form of closing oil trade routes. The bulk of oil is transported using a maritime tanker fleet. More than 1.9 billion tons of petroleum products a year are shipped by maritime transportation, constituting around 62% of all petroleum products. The remainder is transported using pipelines (38%) or trains and trucks, but usually over small distances (Rodrigue, 2004). International oil shipping lanes are forced to go through chokepoints. These are defined as locations “that limit the capacity of circulation and cannot be easily bypassed, if at all. This implies that any alternative to chokepoints involves a level of detour or use of an alternative that translates into significant financial costs and delays” (Rodrigue, 2004, p. 359). These chokepoints have certain physical characteristics, such as the width and depth of shipping lanes, making them vulnerable to blockades for at least a short period of time.

The Straits of Hormuz and Malacca constitute the world’s most important oil chokepoint; almost 30 mb/d flow through these chokepoints. Oil tankers can avoid the Straits of Malacca but only at very high cost and longer journey times. It is virtually impossible today to divert oil transit away from the Straits of Hormuz. The only significant outlet is the Saudi pipeline to Yanbu on the Red Sea, but this pipeline can only handle around 4.8 mb/d. The closure of the Straits of Hormuz therefore represents the ultimate nightmare for the oil market as this chokepoint links the Persian Gulf oilfields to the rest of the world.

Many believe that the narrowness of shipping lanes and the difficulty of oil tankers to manoeuvre make the Straits of Hormuz vulnerable to politically-motivated disruptions. However, history suggests otherwise. In 1983, the Iranians threatened to close the Straits of Hormuz following the delivery of French planes to Iraq. In a radio announcement, Hashimi Rafsanjani (the Speaker of the Parliament) threatened that Iran would block the Straits of Hormuz by sinking a VLCC at the mouth of the Persian Gulf (El-Shazly, 1998). In what was known as the Iraq–Iran ‘Tanker War’, there were 554 attacks on oil tankers in the Straits of Hormuz which resulted in the deaths of 400 sailors and the wounding of 400 more. These attacks did not result in a full blockage of transit. Even when the fight was at its most intense, it disrupted no more than 2% of ships passing through the Persian Gulf (Blair and Lieberthal, 2007).

In the current confrontations between the US and Iran on Iran’s nuclear program, threats to block the straits of Hormuz are again being made. In 2006, the Iranian deputy Basij commander, General Majid Mir Ahmadi, threatened to block oil traffic if the West hurt Iran’s economy over its nuclear program. It is, however, very difficult to envisage a scenario in which the Straits of Hormuz would be blocked for a long period of time. Blocking the Straits of Hormuz would defy international conventions and would increase Iran’s isolation. The closure of this oil transit route would alienate Iran’s allies in Asia and elsewhere as the adverse impacts of the blockade would spread across the globe. In other words, the use of this ‘weapon’ is completely indiscriminate and if Iran attempted to block international shipping, it would face a very wide and powerful coalition.

Blocking maritime activity also means that Iran would have to stop importing much-needed petroleum products. Although it is one of the biggest crude oil producers in the world, Iran does not have enough refining capacity to convert crude oil into

gasoline. The Islamic Republic therefore has to import about 40% of its gasoline to satisfy domestic consumption, costing the government around \$5 billion a year (Fathi and Mouawad, 2007). Sustained shortages of gasoline and rationing may induce social unrest and pose a serious threat to the regime. Recent events paint a picture of what the current regime could face in the event of a blockade. The government's decision in June 2007 to ration monthly fuel allotments and increase gasoline prices at the pump triggered violent protests and riots in Iran's major cities (Bozorgmehr, 2007). The heavy hand of the security forces and the Basij militia were required to suppress the riots.

There are also doubts about whether Iran can physically block the Straits of Hormuz. There are four possible ways that the Straits of Hormuz could be blocked: by placing military artillery on one of the islands located near the shipping channels; by using mines; by sinking vessels in the shipping channel; or by imposing a naval blockade. El-Shazly (1998) and Blair and Lieberthal (2007) assess these possible ways and conclude that none of these is militarily feasible. Artilleries on islands can be destroyed by waves of air strikes. Given the Straits' currents and depth, mines can be removed with little difficulty by minesweeping operations. Furthermore, oil tankers are not as vulnerable as is commonly perceived. During the Iran–Iraq war many oil tankers went through mines without suffering any serious damage. Sinking modern oil tankers by mines and conventional warheads as a way to block the Straits of Hormuz is very difficult and would require large stockpiles of missile, something a small naval power cannot maintain. As Blair and Lieberthal (2007) point out “in order to disable a modern-day tanker, an attack would have to include a salvo of eight to ten missiles with conventional warheads; a sustained campaign would quickly exhaust the missile stockpile of a medium-sized military power”.

Iran could resort to non-traditional offensive operations such as the use of explosive-packed “super-modern flying boats” piloted by suicide bombers or suicide planes. Although such actions can adversely affect maritime activity, the damages caused would likely be limited, could not be sustained for a long time and would not lead to a full blockade of the Straits. Finally, Iran does not have a strong enough navy to enforce a blockade. The Iranian Navy would easily be defeated and neutralized by the strong US Fifth Fleet roaming the Persian Gulf.

Only very extreme circumstances would therefore push Iran to use this latter option and even then it may not succeed in achieving its objective of disrupting oil supplies.¹³ There are therefore serious costs and risks associated with the use of the oil weapon. It is not always effective; it is indiscriminate; and it cannot be sustained for a long period of time. It is certainly not one of Iran's strongest weapons with which to confront the US.

¹³ This does not imply that US military attacks on Iran will not have any impact on oil markets. If the US decides to attack Iran's nuclear sites, the flow of oil would be disrupted as oil tankers would avoid passing through the Straits of Hormuz during the military strikes. Iran's production would most likely halt. This would cause panic in the oil market as countries would compete for oil access causing oil prices to overshoot to very high levels. The impact of this, which should not be confused with the use of the oil weapon, would be temporary and its effects could be mitigated by the use of OECD strategic and industrial reserves. The oil weapon may come into effect after attacks if Iran retaliated by cutting its oil exports. The impact of such a move would depend on the size of the cut and whether the shortfall is counteracted by the use of strategic reserves and/or Saudi Arabia's spare capacity.

3.6 Sanctions: The other oil weapon

The dependence of oil-exporting countries on oil revenues implies that consuming nations also possess an oil weapon. Unlike the oil weapon in the hands of oil producers, consuming countries can use sanctions to target specific countries. Furthermore, when implementing sanctions, they can choose the timing. Sanctions can be imposed when markets are well supplied such that the impact is minimal, such as happened in the 1980s and 1990s when the US imposed economic sanctions on Libya, Iran and Iraq.

In the long history of oil, unilateral and multilateral sanctions have been widely used against oil-exporting countries. The US has been the most active in using sanctions as a tool of foreign policy to induce change behaviour in regimes (Canes, 1997). The effect of sanctions depends on their type and oil market conditions. Multilateral sanctions under the UN umbrella can be very harmful as they have the effect of curtailing oil exports from the targeted country. Multilateral sanctions adversely affect the country's productive capacity by limiting foreign investment and technology transfer in the oil sector. Unilateral sanctions, on the other hand, do not necessarily affect the flow of oil from the country under sanctions. This would cause some temporary inconvenience as the oil exporter establishes new trade partners and seeks new customers. In the short term, therefore, the impact of unilateral sanctions is rather limited. However, if unilateral sanctions are kept for a long time, they would ultimately affect the productive capacity of exporters. For instance, the Iran–Libya Sanction Act (ILSA) imposed by the US against Iran and Libya (it no longer applies to Libya) prohibited international oil companies from investing in the oil sectors of these countries, curtailing their long-term production capacity.

3.7 Assessment of risks to Middle East oil supplies

Given the large geopolitical uncertainties surrounding the Middle East, it is best to analyse the risks of disruption using a probabilistic approach, and to differentiate between their impact on oil supplies and long-term productive capacity. For instance, the probability that a country using the oil weapon is low and if the 'weapon' is used its impact in terms of loss of oil supplies may not necessarily be large. Table 3 lists each of the events discussed above, the probability of it occurring and its impact on output loss and long-term productive capacity.

Table 3. Assessment of event probability and impact on oil supply and productive capacity

Event	Probability	Impact on global oil supplies	Impact on productive capacity
War and civil conflicts	Low/Medium	High	High
Political instability, regime change, revolutions	Low	Low	Medium/High
Successful terrorist attacks on oil facilities	Low	Low	Low
Export restriction	Very low	Low	Low
Closure of trade routes	Very low	High	Low
Sanctions	Low/Medium	Low	High

The picture is rather mixed. The probability of any of the above events occurring is quite low. Should they happen, there would be a wide variation in their potential impacts on oil supplies and productive capacity. However, when it comes to the Middle East, energy policy seems to attach a high probability to any of the above events occurring. In addition, the general perception is that these events would always result in large expected losses in terms of output and productive capacity. In this way, the potential threat to oil supplies from the Middle East is over-stated.

4. Energy Security and Investment in Middle Eastern Oil Sectors

In addition to politically-induced disruptions, the dynamics of the oil market may cause serious market dislocations. The worst possible scenario is one in which the oil supply would fall short of demand. This can occur in two ways: either as a result of peak oil¹⁴ or due to lack of investment preventing the oil industry from maintaining and expanding its productive capacity to meet oil demand (Horsnell, 2000).

4.1 The underinvestment problem in the Middle East

The issue of underinvestment in the oil sector has become central to the energy policy debate.¹⁵ The main fear is that the necessary investment in the oil sector would not be forthcoming and supply would then fall short of demand. Given that the bulk of oil reserves are in the Middle East, the issue of investment in the oil sectors of the region receives special attention. Many international organizations such as the IEA and EIA project that most of the increase in global demand for oil would be met by OPEC and especially the Middle East producers within OPEC. This would require that these Middle East oil exporters increase their investment outlays or open their oil and gas sectors to foreign investment. In an exercise which focused on Middle East and North Africa (MENA) oil and gas resources, the IEA (2005) projected a rise in MENA oil production from the 2004 level of 29 mb/d to 33 mb/d in 2010 and 50 mb/d in 2030 in the reference scenario. In this scenario, Saudi Arabia will remain the largest supplier, increasing its output from 10.4 mb/d in 2004 to 11.9 mb/d in 2010 and over 18 mb/d in 2030. A second important player would be Iraq which is expected to witness the second fastest production growth after Saudi Arabia. The IEA envisages that the MENA share of world oil production would increase from 35% in 2004 to 44% in 2030 with four countries (Iraq, Kuwait, the UAE and Libya) increasing their shares. The IEA warns, however, that this requires doubling of annual upstream investment in MENA which may not take place because “MENA governments could choose deliberately to develop production capacity more slowly...or external factors such as capital shortages could prevent producers from investing as much in expanding capacity as they would like” (IEA, 2005).

Many factors explain why Middle East oil exporters have not invested in the past and are currently reluctant to undertake rapid and large expansion programmes despite the rise in the oil price. The most important factors are discussed in the following.

The large spare capacity and the oil price decline in the 1980s and most of the 1990s threw the industry into deep recession, reduced the attractiveness of existing investment plans and adversely affected the incentive to invest. This was accompanied by widespread demand pessimism and exaggerated expectations of non-OPEC supply. Geopolitics has also prevented capacity expansion in many members of OPEC. For example, the Iran–Iraq war, the Iraqi invasion of Kuwait, the US invasion of Iraq and the lack of security and instability that followed has prevented these countries from undertaking the necessary investment in their oil sectors. Economic

¹⁴ Peak oil considerations have fuelled concerns about energy security and have given rise to calls for oil substitution. Peak oil, however, will not be discussed in this paper.

¹⁵ It is important to stress that the so-called underinvestment problem does not only apply to crude oil production but generally includes shortages of refining capacity, pipeline systems and storage facilities (Fattouh and Mabro, 2006).

sanctions against Iran, Libya and Iraq limited the access to technology and foreign capital and hindered capacity expansion.

In addition, the relationship between the owner of the natural resource (i.e. the government) and the national oil company which extracts the resource is highly inefficient, yielding low rates of investment. In many countries in the region, the national oil company does not determine its capital budgets. This decision is usually determined subject to general government budgetary requirements, rather than available investment opportunities in the oil sector. This implies that the capital budget for national companies is quite tight and most of the time prevents them from undertaking new projects.

Investment is also complicated by the relationship between the governments and/or national oil companies and the international oil companies. International organizations such as the IEA consider that restriction of access to reserves is an important barrier to investment. However, access is not the central issue since such access is effectively restricted only in Saudi Arabia and Kuwait with the latter developing plans to open its sector to foreign investment through Project Kuwait. What matters most is the nature of the relationship between the two parties. Experience has shown that even in countries where access to reserves is allowed, there may be important obstacles that could delay or prevent investment by international oil companies. As markets have tightened and we transition again from a buyer's to a seller's market, the terms and conditions demanded by the owners have been hardening over time.

Oil prices have often been volatile, blurring the distinction between transitory and permanent price movements. As suggested in the literature regarding irreversible investment under uncertainty, the large investment outlays in oil projects and the irreversible nature of these investments have the effect of increasing the value of the option to wait. There is thus a case for delaying the investment until new information about market conditions arrive, especially information about expected global demand and oil supplies from other countries. For the oil industry, the option to wait is very valuable. After all, the decision to defer rather than invest immediately, or increase production, is more profitable than to invest and increase production in the face of falling global demand. In other words, it is more profitable for all oil investors (national and private companies) to err on the side of under-investing.

The underinvestment problem in the oil sector has many facets and cannot be attributed to a single factor. Given the various dimensions of the underinvestment problem, energy policy has not been successful in tackling the issue of underinvestment in the oil sector. There have been some recent efforts to promote the so-called 'producer-consumer' dialogue to help remove obstacles to investment. This dialogue was formalized in 2003 and a new institution, the International Energy Forum, was set up to promote the dialogue between consumers and producers. Although this represents a positive development, the effects, if any, are likely to appear only in the long term. In fact, there are doubts as to whether this dialogue would result in any measures that could have a real impact on encouraging investment in the oil sector.¹⁶

¹⁶ While oil importers have been calling for security of supply, oil producers have been calling for security of demand. This debate, however, has not moved forward and the dialogue has been scaled down to developing agreements on better dissemination of information about supply and demand and exchanging views about oil market conditions.

4.2 Investment, spare capacity and the security margin

An important aspect of the current energy security system has been the availability of spare capacity. The maintenance of spare capacity or a 'security margin' in the oil supply chain by a few Middle Eastern oil exporters has on many occasions helped fill the shortfall caused by spectacular disruptions. However, since the mid 1990s, this large spare capacity has been in continual decline and by 2004 it reached very low levels. The issue at this junction is whether this spare capacity could be re-established.

To address this issue, it is important to first stress that the large spare capacity in the mid-1980s was not the outcome of policy decisions aimed at providing a security margin for global oil markets. Instead, it was a residual outcome as global demand for oil fell and non-OPEC supply witnessed a rapid increase. Due to the unwillingness or inability of national oil companies to invest unless security of demand is guaranteed, the ability of oil-exporting countries to provide a security margin has diminished. This is especially true if one takes into account that most of the available spare capacity consists of heavy crude which refineries cannot cope with. In the current context, unless there is a reduction in oil demand, it is highly unlikely that spare capacity will reach the unprecedented levels it achieved in the mid-1980s. The loss of spare capacity will have strong implications for both the functioning of the oil market and the energy security agenda (Fattouh, 2006).

5. Oil Exporters' Policy

Horsnell (2000) argues that supply discontinuities (defined as changes in the oil export policy of the producer country which cause sharp changes in oil price) are “far more common than disruptions, are often longer lasting and in terms of barrels removed are normally of a greater magnitude” (p. 7). He notes that over the period from 1999 to early 2000, OPEC’s withdrawal of oil barrels amounted to a greater loss than the Gulf crisis, with the withdrawal exceeding 1 billion barrels. Middle East exporters, mainly Saudi Arabia, played the leading role in implementing these cuts. In fact, for many observers, OPEC production policy constitutes a threat to the global economy. Adelman (2004) argues that “the real problem we face over oil dates from after 1970: a strong but clumsy monopoly of mostly Middle Eastern exporters cooperating as OPEC. The biggest exporters have acted in concert to limit supply and thus raise oil’s price...The output levels they establish by trial-and-error are very unstable. OPEC has damaged the world economy, not by malice, but because its members cannot help but do so.”

Although OPEC output policy impacts oil supplies and often looks like a disruption, these withdrawals should be placed in their proper context. OPEC production quotas are implemented when the market is perceived to be oversupplied and when oil prices have fallen below what OPEC considers ‘acceptable’. In other words, a change in oil exporter’s policy is very often a reaction to weak market conditions. In its attempt to fine-tune the market, OPEC policy may cause oil prices to overshoot if it overreacts and engages in excessive cuts. In other instances, OPEC’s decision-making process may induce volatility. Given the uncertainties of demand and supply, the lack of reliable and timely data about consumption, production and inventory levels and the unreliability of short-term forecasts, it is difficult for OPEC to anticipate the direction of the market. Even if OPEC is able to correctly predict the direction of the market, implementing the agreed policy can prove to be very difficult because of OPEC’s structure. The organization is a coalition of a heterogeneous group of countries facing distinct economic, social and political challenges and with no incentive to share information. OPEC has no monitoring system to oversee production and shipments and, more importantly, no punishment mechanism to deter cheaters. This structure which is unable to generate clear signals to the market may induce considerable uncertainty about future oil supplies, contributing to oil price volatility (Fattouh, 2007b).

This lack of precision in controlling the market should not, however, obscure the fact that cuts are usually implemented in reaction to weak market conditions. One may wish to evaluate the costs and benefits of OPEC’s actions, but considering OPEC cuts as a threat to security is farfetched. Production cuts are not designed to act as an instrument to restrict the flow of oil supplies to achieve political objectives, but rather as a tool for oil market management. Furthermore, energy security should be broadened to include the perspective of the oil exporters. Since oil revenues constitute the main source of income for Middle East exporting countries, very low oil prices comprise a source of insecurity which would eventually force them to react. In fact, one could argue that failure to react to low oil prices may undermine the ability of the Middle East exporters to act as reliable suppliers; low oil prices may induce economic and social unrest which in turn can undermine the security of oil supplies to the rest of the world.

6. Concluding Remarks

The current global energy security system has emerged largely in response to the 1973 oil embargo. Since then, it has evolved slowly and is based on: the strategic stockpiling of crude oil; coordination on sharing oil supplies and oil stocks in cases of emergency and disruption; pursuing policies of energy conservation and promoting efficiency measures; monitoring and analysing the oil market; increased transparency in the oil market data; and, more recently, engaging in constructive dialogue with oil producers. At the heart of the new energy security system is the IEA, responsible for coordinating energy responses of OECD countries in case of emergencies.

Some elements of the energy security system might have some usefulness but only in the long term (Yergin, 2007). For instance, in any energy security debate, restraining demand and/or increasing energy efficiency are always present. Others emphasize the importance of enhancing transparency in oil market data in resolving uncertainties and encouraging investment. While such measures must be encouraged, their effects on energy security are only in the long term and they therefore do not provide the appropriate mechanism to deal with short- or medium-term supply disruptions.

If oil-importing countries are concerned about supply disruptions from the Middle East, then the maintenance of strategic reserves is the only concrete and effective instrument available to them. Any shortfall of oil supplies due to political instabilities, wars and terrorist attacks can be straightforwardly dealt with by calling on strategic reserves. Strategic reserves also provide time for governments to determine whether the causes for disruption are short term and to consider the available options.

The guidelines under which these reserves should be released have been heavily criticized as being unclear and outdated. A common argument is that in many occasions in the past, oil-importing countries have been reluctant to release strategic reserves to calm down the market, inflicting unnecessary cost on their economies. These shortcomings do not, however, negate the effectiveness of this policy instrument in dealing with oil disruptions. An important objective of energy security should be to revise the guidelines under which stocks could be released. Furthermore, the so-called ‘producer–consumer’ dialogue should aim at coordinating efforts in the area of strategic reserves, for example by coordinating efforts on the volume of strategic stocks that should be kept, the timing of filling and releasing of strategic stocks and whether new countries should aim at holding strategic stocks.

On the other hand, measures to enhance oil independence from the Middle East are unrealistic, costly and counter-productive.¹⁷ First, politically-induced oil disruptions in the Middle East have been the exception rather than the rule in the long history of the oil market. Second, reducing dependency on Middle East oil implies higher dependency on other exporting countries which are also unstable and suffer from the same problems that plague the region. Third, policies aimed at reducing dependency on the Middle East can backfire as countries may not feel the pressure to invest to increase production. In fact, it is an irony that many Western governments call for

¹⁷ Adelman (2004) emphasizes this point from a different perspective arguing that “it does not matter how much oil is produced domestically and how much is imported. Presidents may declare that there is an ‘urgent need’ to cut imports and boost ‘energy independence’ – no one ever lost political support by seeing evil and blaming foreigners. The facts are less dramatic. Imports do not make any importer ‘dependent’ on any particular exporter, or even all of them taken together. Therefore, direct or indirect spending to reduce imports is a waste of resources.”

reducing dependency on Middle East, while at the same time are urging Middle East producers to increase investment in their oil sector to meet the expected rise in demand. In any case, policies to reduce dependency on the Middle East have all failed in the past and will meet the same fate if applied in the future.

The oil market is most likely to continue to be subject to shocks and disruptions. One cannot rule out the possibility that a sizeable interruption in oil supply may originate from the Middle East. But in the unlikely event that such a spectacular disruption takes place in the coming years, this would most probably be due to failures of foreign policy that would perpetuate new wars, civil conflicts and sanctions.

One cannot blame US foreign policy for all the ills, tribulations and dilemmas that currently engulf the Middle East. The region is full of contradictions and divisions; it was only a matter of time before some of these surfaced. However foreign policy, based on the perception that in order to achieve oil security the US must directly or indirectly exert control over the Persian Gulf, has exacerbated existing problems and conflicts and may have modified the nature and the outcome of existing contradictions. It is very unfortunate that rather than adjust foreign policy to the new reality that emerged after the end of the Cold War, US misguided obsession with the security of the Persian Gulf continues to dominate foreign policy agenda (Hadar, 2005). In perpetuating such a strategy, the US may indeed have undermined, rather than enhanced, its energy security. The future stability of oil supplies from the Middle East rests more on a balanced foreign policy approach towards the problems of the region and less on oil market dislocations, OPEC production policy or voluntary restrictions by Middle Eastern exporters.

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