Chapter IV
Oil Shocks and Their Impact on India

Although the Cold War was over by the summer of 1990, but the new, more peaceful world was yet to emerge for 1989 had certainly been the *annis mirabilis* the miracle year in which the international order had been remade. Democracy appeared to be taking hold in many countries where, until shortly before, such a possibility would have been dismissed as totally unrealistic. German reunification was no longer an abstract subject for rhetoric and discussion, but an imminent reality; and the reunified Germany would be the predominant power in Europe. Japan was now recognized as the global financial powerhouse; and the confrontation of the future would surely become global competitions for money and markets, a prospect that seemed so ordinary that some said what was at hand was not only the end of the Cold War, but also ‘the end of history’.¹

Oil remained high on the agenda of environment concern, but otherwise it appeared to have become rather unimportant, indeed just another commodity. Consumers were happy, for oil prices were low. There did not seem to be any long-term problem of supply; after all, proven world oil reserves had been mightily increased from 670 billion barrels in 1984 to 1.0 trillion barrels in 1990. Yet, amidst the complacency, there were reasons for caution. While vast additions had been made to world oil reserves, they were all concentrated in the five major oil producers of the Persian Gulf, plus Venezuela. There was no large inventory of diversified, non-OPEC oil waiting to come into the system, as had been the case with Alaska, Mexico, and the North Sea at the time of the 1973 crisis. The Persian Gulf’s share of world oil reserves had now actually increased to two-thirds of the total.²

In economic terms, the oil picture looked a lot less like the early 1980s than the early 1970s, which had set the scene for the 1973 oil shock. The world petroleum market was tightening. Demand was growing with some vigor. American production was plummeting between its 1986 high and 1990, by two million barrels per day, a volume greater than the individual output of 10 out of 13 OPEC countries in 1989. United States oil imports were at the highest level ever, and still going up. The world was moving beck to high dependence on the Persian Gulf. The ‘security margin’ the gap between demand and production capacity was shrinking, which would make the market more susceptible to

¹ Daniel Yergin, *The Prize*, p.769.
conflict and accidents. That margin had been large enough in the early and mid 1980s to absorb the Iran-Iraq War with all its disruption and loss of output, but no longer.

How high would oil prices go? That was dependent on how rapidly new production capacity was added around the world. With low prices and the renewed confidence about the security of supplies, conservation had run out of stream. The effort to develop alternative sources had become even weaker. In addition, an overall immobility had taken hold in many countries, reflecting the inability to resolve the conflict between energy and environmental concerns. Still, energy crisis did seem a thing of the past. At a U.S. Senate hearing in the spring of 1990, it was argued that the probability of a major disruption was minimal, at least for the next several years. And some futurists and analysts announced in the spring of 1990 that there could not possibly be any oil crisis in the decade.³

On August 2, 1990, Iraq invaded Kuwait. Meeting little resistance, Iraqi tanks were soon rolling down the six-lane highway toward Kuwait City. And so the first post-Cold War crisis turned out to be a geopolitical oil crisis. Over the preceding several years, most of the petroleum exporters had sought to rebuild the links to the consuming countries that had been broken in the 1970s. Owing to the huge additions to reserves, these producers no longer worried that they were rapidly wasting a depleting resources. Instead, they wanted to demonstrate that they were reliable, long-term suppliers, that they could safety to regarded as the energy reserve for the industrial world and that petroleum could be counted on. Oil needed markets, and markets needed oil; that calculation of mutual self-interest would be the basis of a stable, constructive, non-confrontational relationship that would extend into the twenty-first century.⁴

Saddam Hussein was a strangely anachronistic figure, a kind of throwback. He asserted himself with the nationalistic rhetoric and anger off the 1950s and 1960s. He would say that Joseph Stalin was one of his models; at the very time that Eastern Europe and the Soviet Union were trying to extricate themselves from the legacy of Stalin's terror and hypocrisy. Saddam Hussein created his own massive cult of personality.⁵ The Iran-Iraq War, which Saddam Hussein had launched, had cost the country half a million deaths and serious causalities and had ended in a stalemate. Yet a nation of eighteen million was continuing to support a million-man army. Hussein wanted higher oil prices and very soon; Iraq was devoting about 30% of its gross national product to Saddam's war machine, and even as Iraq scoured the world for new, deadly, and sometimes bizarre weapons, it was not paying its international bills.⁶

⁵ Jill Crystal, Oil and Politics in the Gulf (Cambridge: Cambridge University Press, 1990), p.87.
With the invasion, the Kuwait royal family fled, and the small country was in Iraqi hands. The Kuwaitis had survived over two centuries by being smart and knowing how to play neighbors and large powers off against each other; and even when the Iraqi troops massed on their borders, they though they could outsmart the Iraqi as they had done for so long. This time, however, they were taken by surprise. Saddam Hussein claimed that Kuwait belonged to Iraq and that the Western imperialists had snatched it away. Actually, Kuwait’s origins went back to 1756, two decades before the United States declared its independence, and certainly much before the beginnings of modern Iraq, which was knitted together in 1920 out of three provinces that had been part of the Ottoman Empire for four centuries and, for several centuries before that, had been outlying provinces of various other empires. The Iraqis said that the British had drawn their border with Kuwait to deny Iraq its due and its oil. In fact, the border adopted at a 1922, conference which deprived Kuwait of two-thirds of its territory was a simple copy of the border the Turks had agreed to in 1913, before the First World War. Moreover, in 1922, expert opinion held that there was no oil in Kuwait.

In 1980, in launching the war with Iran, Saddam Hussein had made a grave geostrategic miscalculation, one that had almost cost him his position: he had assumed that it would take only a few weeks to knock off Iran, he was wrong, and Iraq came close to being defeated. A decade later, in 1990, he assumed that he could swiftly absorb Kuwait and confront the world with a fait accompli, which would arouse some complaints but little else, in the meantime, he would have solved his financial problems overnight and would have acquired the wherewithal to finance his offensive military and political ambitions. He would be the hero of the Arab world; Iraq would be the number one oil power; and, like it or not, the Western Countries would have to bow before him.

Once again he had miscalculated. And that was the second surprise. The opposition to his move developed an unprecedented unanimity in the international community and in much of the Arab world. ‘This will not stand, this aggression against Kuwait’, George Bush announced a few days after the invasion. And he meant it. The United States, making use of personal connections with other leaders that Bush had developed over twenty years, took the lead in marshaling and coordinating the opposition. It was a far more successful and stunning diplomatic achievement than Saddam Hussein or indeed many others could possibly have expected. The Iraqis had failed to recognize how drastically the interests and position of the former Soviet Union, until recently an ally. Had shifted. The United Nations did what the League of Nations had failed to do in the 1930s imposed an embargo to frustrate aggression. But Kuwait was not the end of the matter. The disposition of Iraqi forces and the way they were being resupply suggested that they might plunge on toward the lightly defended Saudi oil field. Fearful that Saudi

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Arabia might well be next on Hussein's list, many countries hurriedly sent military forces into the region. American forces were by far the largest component, reflecting guarantees that went back to Harry Truman's letter to Ibn Saud in 1950. With Kuwait absorbed into Iraq, there would be only two friendly producers. George Bush summed up the dangers as he saw them: "Our jobs, our way of life, our own freedom and the freedom of friendly countries around the world would all suffer if control of the world's great oil reserves fell into the hands of Saddam Hussein". The Ba'th doctrines provided the rationale to reach far beyond Iraq's current borders. A greater Iraq, which had succeeded in absorbing Kuwait, would be well on its way to turning itself into an alarming nuclear weapons state. In short, oil was fundamental to the crisis, not "cheap oil", but rather oil as a critical element in the global balance of power, as it had been ever since the First World War. Such is one of the great lesions of the twentieth century. Owing to the disruption and the embargo, four million barrels of oil were abruptly removed from the world oil market on the same scale as the 1973 and 1979 crisis. The uncertainty was very high, and, as in previous crisis, unsure companies and consumers built inventories. Oil prices skyrocketed, and financial markets plummeted. A new oil shock was at hand the Sixth Post War oil crisis. OPEC was thrown into its worst crisis ever by the Iraqi invasion. It would not take Saddam Hussein, equipped with nuclear and chemical weapons know-how, long to turn Iraq into a regional power and perhaps, as Hussein extended his reach, into a global superpower. At a certain point, it would become too costly and too dangerous to try to check him. And the Post-Cold War order would turn out to be different and Iraq, further isolating Iraq and, in effect, underlining their commitment to a new alignment with their customers.

The sharp price rise was driven not only by the supply loss itself, but also by anxiety, fear, and anticipation of conflict. When, in late September 1990, Hussein threatened to destroy the Saudi petroleum supply system, prices on the futures, markets leaped toward $40 per barrel, more than double what they had been before the crisis. The high prices reinforced recessionary trends in the US economy. As crude prices rose, so did gasoline prices, accompanied by criticism and investigations. This time, however, in contrast to 1973 and 1979, there were no allocations or controls in the United States to hinder market responses, and neither gas lines nor any significant supply distortions resulted. The global supply system responded both to higher prices and to urgent appeals for increased production. By

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December 1990, the lost production had been completely compensated for with ‘relief’ oil produced from other sources. Saudi Arabia alone brought three million barrels per day of shut in oil back into production, making up for three-quarters of the lost supply. Other major increments of additional supply came from Venezuela and the United Arab Emirates. But any country that could increase its production by 25,000 or 50,000 barrels per day also hastened to do so. 13

At the same time, demand was weakening, as the United States and other countries headed into economic recession, which in turn meant a reduction in the need for oil. While the International Energy Agency did not formally activate its emergency energy security program, it did take a leading role in informal coordination. From an oil perspective, one big question stood out. Would the United States use its Strategic Petroleum Reserves, created in the middle 1970s and now holding about 600 million barrels of oil, in the events of further disruption? For a couple of months, there was a spirited debate as to “original intent’. Was the SPR (Strategic Petroleum Reserves), to be used only in the event of “physical shortage”, or was it also to be used to head off a major price spike that would seriously damage the economy? Some pointed out that a physical shortage might exist at $20 a barrel but would be eliminated at $40 through; in the meantime, a doubling of the oil price would deal a heavy blow to the economy. By November 1990, the debate was resolved. In the event of conflict, the principle of “early release”, previously promoted by the Regan Administration, would be applied, and the SPR (Strategic Petroleum Reserves), might well be used to flood the market with oil, preventing sharp price hikes driven by a panic build-up of inventories, as had happened in 1973 and 1979. Altogether, then, by late autumn, the supply-demand picture was improving day by day, and prices began to decline. Still, as the crisis dragged on toward the winter, the fundamental question remained: What would happen if military conflict actually started? 14

As much as six million barrels of oil a day were going up in flames considerably more than Japan’s daily oil imports and not all that much than US imports. 15 Whether the Gulf crisis was really over was not yet clear. And, certainly, the end of the war raised new questions the political organization of Iraq and the matter of who would lead it, security relations throughout the entire region, entwined as always with the security of oil; the reconstruction and future of Kuwait; prospects for peace in the Persian Gulf; relations between oil producers and consumers; the character of energy policies and strategies in the industrial world; and the future of Hydrocarbon Man himself. 16


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World is continually remade by technology and innovation. Together, they have given rise to pervasive computerization, global communication, and an “information economy” that now coexists with the “industrial economy” inherited from the nineteenth century. Much of the leadership and dynamism in the modern economy has passed to what the Japanese call “knowledge-based” industries. Yet petroleum remains the motivating force of industrial society and the lifeblood of the civilization that it helped create. It is still the basis for the world’s biggest business, one that embodies the extremes of risk and reward, as well as the interplay and conflict between entrepreneurship and corporate enterprise, and between private business and the nation-state.17 It is remains as was demonstrated in the Gulf crisis of 1990 and 1991 an essential element in national power, a major factor in world economies, a critical focus for war and conflict, and a decisive force in international affairs.

And what of the years ahead? A variety of global scenarios and risks can be identified for the future of oil and world society. But certainly one of the lesions of the history of oil is to expect the unexpected the “surprise” that becomes perfectly obvious only after the fact. Violence, wars, technological hazards, political explosions, economic imperatives, ethnic or religious or ideological or social conflicts all can come as surprises, affecting access to oil. But a surprise may also take other forms. It could be major shifts in world economic growth patterns, for instance.18 Or it might be a technological breakthrough in alternative energy production, diminishing oil’s importance, that comes out of some American laboratory or, increasingly likely, a Japanese laboratory, after all, by the end of the 1980s, the Japanese government was spending more on energy research and development than the American government. A surprise could arise from an environment crisis, leading to a major alternative in the energy economy. Or it could from the former Soviet Union.

The politics of the former Soviet Union might well have a major impact on world energy in the years immediately ahead. The former U.S.S.R. is the world’s largest producers, with output in 1989 more than double that of Saudi Arabia, and it is the world’s second largest exporter after Saudi Arabia. Time after time in years past, the fortunes of Russian oil have had significant global impact, beginning in the nineteenth century, when the development of an oil industry in Azerbaijan around Baku broke the global grip of Standard Oil and indeed the virtual monopoly of western Pennsylvania. The Revolution of 1905 resulted in the first politically induced interruption of significant world oil supplies. The Bolsheviks’ stepped-up export campaign in the 1920s instigated the global price war that led to the meeting at Archnacarry Castle in Scotland in 1928 and the “As-Is” agreement. In the late 1950s, the

18 Ludwell, Denny, We Fight for Oil. 1928. (Reprint. Westport, Conn.: Hyperion, 1976), p. 323.
“communist oil offensive”, the Soviet drives for market share, stimulated the price-cutting that gave birth to OPEC.19

Today, the Russian export of oil (and gas) is vital for its entire system. They constitute its main “cash crop”, in excess of 60% of the total hard currency earnings that are essential for the purchase of technology and food aboard. But the Russian oil industry is in the grip of a crisis brought on by inefficiency and low productivity, poor organization and technological backwardness, waste and environment neglect. “Energy policy has been the single most disruptive factor in former Soviet industry since the mid-1970 and one of the leading proximate cause of the downturn and stagnation of Soviet economic growth”, former Soviet expert Thane Gustafson has noted.20 Energy problems proved to be among the most important obstacles to economic reform. The accumulated difficulties and the reduction in investment have meant that the long-predicted decline in former Soviet oil production has begun, and output is falling sharply. If exports also decline significantly, the effects will be felt throughout the world.

The former Soviet oil industry is suffering from the same disorder and, indeed, demoralization that afflict its society as a whole. There is great eagerness today in the Russian bring Western capital and technology into the oil and gas sector reminding one of Lenin who, during the New Economic Plan of the early 1920s, talked about putting a “quarter of Baku’ up for international auction. And the Western companies are very interested. The Russia leads the world in natural gas reserves, and the companies believe that the oil potential might prove enormous as well. But the companies and, indeed, the industrialized nations of the world find themselves hindered by the disorganization, political conflict, immobility, confusion, uncertainty, and risk that characterize the entire former Soviet system. The former Soviet energy sector is also afflicted by the ethnic conflicts that have erupted throughout the nation following glasnost and the lifting of the heavy hand of communist control. In contrast to the heady days in the nineteenth century when Baku was one of the world’s two main sources of petroleum, the former Soviet Republic of Azerbaijan today produces less than 3% of total former Soviet oil, but is the main source for the services and supplies that support the industry throughout the country. And the civil war that broke out between Azeris and Armenians in 1989 saw a return of the bloody violence of 1904-05, only acted out now not with single-action rifles but with AK-47s. These and other ethnic conflicts could end up seriously impeding the production of oil, and thus reduce further the flow of Soviet petroleum to the world market. The worry about too much Soviet oil coming into world markets which animated do many critical events in the history of oil could be turned upside down in the 1990s

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Figure 11

Persian Gulf Proven Oil Reserves in 2000

- Saudi Arabia: 25.6%
- Iraq: 9.93%
- UAE: 9.74%
- Kuwait: 9.33%
- Iran: 9.22%
- Natural Oman Zone: 0.49%
- Qatar: 0.44%
- Other: 0.36%
Figure 12

Persian Gulf Proven Gas Reserves in 2000

- Saudi Arabia: 3.75%
- Iraq: 2.24%
- UAE: 4.19%
- Kuwait: 1.08%
- Iran: 14.31%
- Oman: 4.62%
- Qatar: 0.36%
- Bahrain: 0.36%
Figure 13

The Muslim Population and Location of Oil Reserves
by significant shortfalls. Yet ultimately, if development proceeds, the former Soviet Union could end up an even more important exporter.  

If there are new surprise, new crisis, how well prepared are we? After the 1973 oil shock, it is clear that the oil companies could not and would not manage future crisis by themselves, and that it was up to government to take on that role. In the years since, the industrial countries have developed an energy security built around the International Energy Agency and the strategic stockpiles, such as the US Strategic Petroleum Reserves and the similar reserves in Germany and Japan, which can be brought into play to avert a shortfall and counteract a panic. The IEA (International Energy Agency) provides a framework for coordinated response and for the exchange of timely, accurate information among nations an absolute requirement to head off any such panic. The years of past oil crisis have demonstrated that, given time, markets will adjust and allocate. Those years also provided evidence that government do well to resist the immediate temptation to control and micro-manage the market. Of course, it is hard for governments to resist action when uncertainty is high, panic is building, and accusations are mounting. Yet the course of the six major disruptions from the early 1950s through 1991 has revealed that the logistical and supply system can adapt to such an extent that the real problem in the 1970s turned out not be an absolute shortage, but the disruption of the supply system and the confusion over ownership of oil, with the consequent rush to reorder the system under conditions of high uncertainty. And in 1990 and 1991, the lessons of previous crisis, along with the mechanism developed since the 1970s and improved information, made the impact of the disruption that came with the Gulf crisis less serious than it might otherwise have been. Even if experience points the way to better-managed reactions, there are other important questions. During the oil crisis in the 1970s, the United States political system was paralyzed in the face of one of the biggest and most costly disruptions of the postwar era. Anger, finger pointing, scapegoating all became a substitute for the development of a rational reaction to very serious problem. Watergate, of course, was part of the explanation. Still, the spectacle of that fragmented, contentious response, characterized by the pursuit of a galaxy of conflicting special interests, provides reasons to ponder how, even after the Gulf crisis, the United States will response over the long haul to future energy needs and crisis.  

Two decades ago, within a period of a few months surrounding October 1973, the international price of crude oil triples. One of the consequences of this shock to the world oil market was to put energy security and, more specifically, security of oil supply at the heart of the energy policy agenda of most industrialized nations. One decade later, in March 1983, OPEC, marking the start of a new order

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on the world oil market, announced a drop of $5 per barrel in the official price of oil. By then, concerns about the security of oil supply were rarely voiced. This situation prevailed for the next few years, a period during which nominal oil prices in US dollars were largely constant.

In October 1985, Saudi Arabia adopted netback-pricing scheme and sharply increased its oil production. A number of other OPEC members soon followed Saudi Arabia’s lead and, as a result, the world price of oil ‘collapsed’ in the first half of 1986. Since then, excluding a five-month period surrounding the 1990-91 Gulf War, price have been stable, varying for the most part within a narrow band around $18 per barrel (Plourde and Watkins 1994). It seems ironic that this recent trend in the world oil market has been accompanied by a return of calls for strong policy measures designed to provide energy security for O.E.C.D., nations. In fact, both in the scholarly literature (e.g., Hall 1992, Bohi and Toman, 1993) and policy statements issued by various governments (e.g., US Department of Energy 1991), concerns surrounding the issue of security of oil supply are being expressed anew.23

A decrease in the price of oil brings a substitution toward oil and out of other energy sources used as inputs in production. An increase in oil consumption, coupled with limited domestic production capabilities at prevailing world prices, implies that oil imports increase. An increased reliance on imports threatens energy security (or, brings energy insecurity). Energy insecurity increases the probability of an oil shock of the sort experienced in the 1970s and, were such a shock to occur, its effects will be felt more strongly by a given country’s economy, the more dependent on imported oil is this country. Therefore, energy security at large and security of oil supply in a particular, should be a cornerstone of energy policy.24

The soundness of this argument resets on two elements: (1) It must not be possible to dismiss the likelihood of future oil price shocks, and (2) Import reliance must undermine security of oil supply, thereby hampering the effectiveness with which the economic consequences of an oil shock can be managed. This second element presupposes a third one, namely, that the term “security of oil supply” can be can be defined precisely enough to allow the articulation of set of polices that would bring it about. Concerns about security of supply arise because policy-makers, among others, believe that the world could experience other oil shocks, and because past events have demonstrated the difficulty of predicting when these shocks will occur. It is clear, however, that OPEC production would have to be


24 At this stage, we focus on this place of security of oil supply in the policy agenda of an oil-importing nation, and do not address energy security at large. We return to this distinction in the subsection entitled: “security of supply as a Long Run Goal”.

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significantly disruption for an oil crisis of the type experience in the 1970s to materialize in the next decade. An analysis of the factors responsible for past oil supply disruptions seems relevant in assessing the possibility of such shocks occurring in the future. One such set of factors can broadly be describes as political and institutional development in the Persian Gulf (e.g., armed conflict, sale embargoes). A second set of considerations relates to the economic behavior of OPEC’s production and pricing decisions based on oil market conditions and on the actions taken by others agents on that market. The oil supply disruptions experienced since 1950 are routinely identified in the literature by the political events in the midst of which they occurred25 the Iranian boycott of 1951-52, the Suez Crisis of 1956, the six-day war of 1967, etc. in fact, all of these disruptions can be linked to specific political development in the Persian Gulf.26 The events associated, with the 1990-91 Gulf War are a recent reminder that political forces can, at least temporarily, interrupt a source of supply. There seems to be no reasons to believe that political and institutional factors will cases to contribute an element of randomness to the ability of Persian Gulf producers and thus of key OPEC members to deliver supplies. Furthermore, since there remains much uncertainty as to the causes and timing of future events, these political developments are largely unpredictable.

It is extremely unlikely that Saudi Arabia would not have known that its production cutback would lead to further tightening of the world oil market. This action, in turn, led oil-importing nations to update their expectations about the duration of the disruption, and their assessment of the prospects for returning to pre-October 1978 production and price levels. It is not surprising that oil-importing nations changed their inventory behavior, even if the decisions taken then were to prove to have been misguided later on.27 This evidence supports the proposition that OPEC can still willfully exercise its market power to affect the operation of the world.28 However, our limited understanding of OPEC’s decision-making process, and the even more limited predictive power of existing models, is such that little light can presently be shed on the probability of economically motivated disruptions occurring in the future.

The Oil Shocks

We have argued that concerns about the possibility of future oil shocks are quite to justify, and that, broadly speaking, two classes of factors can be at the root of such disruption: political and institutional factors on the one hand, on the other, the willful exercise of market power by OPEC. We will call the first type “random shock” and the second type “strategic shock”29 This terminology was chosen to

29 Vance (1991) who distinguishes between “Accidental” and “Deliberate” disruptions draws a similar classification of oil shocks.
emphasize that this classification of shocks is based on whether or not the cause of the supply disruption is attributable to the economic behavior of producers. In the first case, the supply disruption is by producers, while in the second case, the disruption streams from their intentions as economic agents.  

This classification also yields clear distinctions in terms of the consequences of two types of shock, for instance, the case of a random shock. Some event, such as the outbreak of armed hostilities, or the breakdown of major pipelines, occurs. It is reasonable to surmise that producers not directly affected by the event in question will seek to change their production levels. Indeed, their production plans were made for market conditions, which have not materialized, and thus these plans may no longer be appropriate. If production levels are increased, this will serve to alleviate both the reduction in world supply and the price increase. Furthermore, once the specific cause of the shock has resolved itself, world price and production should return to levels close to those prevailing before the shock. The duration of the shock, and the amplitude of the price increase, can depend on various aspects of market conditions, such as the presence of excess capacity, the precise state of demand, or the extent to which government policies allow the transmission of price signals to domestic markets. Further, since oil prices may depend on the amount of reserves held, and since the extraction rates may have changed during the shock, the pre-shock prices and production levels may not be precisely re-instated. But, broadly speaking, one would expect the effects on oil prices of a random shock to be purely transitory. As the price movement that followed Iraq’s invasion of Kuwait in 1990 fit the particulars just described. The prices of West Texas Intermediate and Brent, two widely traded crude oils, rose sharply for a short period of time, and fell returned to levels quite similar to those prevailing prior to the shock.  

By contrast, a strategic shock may imply a permanent shift in the path of oil prices. From our definition of a strategic shock, production cutbacks or increases result from OPEC’s decision-making process. OPEC’s desire to modify its production plans could stem, for instance, from a change in market demand, or from a change in the cost of extraction of one or more of its members, due perhaps to bringing new production facilities on stream. Given that these types of changes are not perfectly foreseeable, they may lead to discrete, identifiable re-alignments in production levels. If these changes to the market environment or to the constraints faced by producers are permanent, then one should expect the change in production to have long-run effects on the level of prices. It is possible, of course, that following a price increase, increased production by fringe producers may somewhat temper the effects on price. However, contrary to a random shock, the actions of OPEC members themselves will not work to alleviate the increase in prices. The previously quoted passage offers evidence that the 1986

32 Hogan (1981) also distinguishes between shocks for which Oil Production is eventually restored, and those that lead to a New Market regime.
price collapse was a 'negative' strategic shock 'negative' in the sense that the shock exerted downward pressure on oil prices. Indeed, he contends that the change in the path of oil prices resulted from a change in market conditions; namely, a decrease in the demand for OPEC produced oil, which led to a re-alignment in the production levels and market shares of OPEC members.

Before closing this argument, we must point out that the dichotomy of supply disruption just presented is not the only way to classify oil shocks. As we mentioned previously, it has been customary to associate each shock with a particular political or institutional genesis; however, as we have argued, this obscures the fact that the events in question, taken alone, cannot always explain the observed market disruption. One also often encounters in the literature a classification of oil shocks based on the persistence and magnitude of the ensuring price effects. Our classification induces at least a partial ordering of disruptions along this dimension: a random shock can only induce transitory price movements and, conversely, long-run shifts in the path of oil prices only occur following a strategic shock. Furthermore, for the policy discussion, which follows in the last but one section, a classification based on the causes of disruptions is more useful than one based on their consequences, which can only be observed ex-post, and hence after a policy initiative should have been undertaken.

Modeling supply in the world oil market presents two special problems. First, oil is a mineral. Analysis and data gathering have been distorted by the myth of 'limited resources': the quest for non-existent fixed stocks and the neglect of flows. Seconds, supply is unlike demand. The amount of oil demanded results from the independent choices of millions of households and firms. A higher price means less is demanded, a lower price means more. Prices rose when the market became 'tight', then fell because of a 'glut' when must in time disappear. Indeed some models are explicitly cyclical: too low a price once caused deficient investment and output, hence higher prices, which drew in too much investment to bring down prices to the current 'low' level, and so on. The markets tighten in the 1990s, as the pressure of rising consumption presses against reserves dwindling everywhere but the Persian Gulf.

Consumption or monopoly makes only a minor difference. Long-term, the price must rise in any case because oil is a 'nonrenewable resources'. The monopoly prices are at first higher than the competitive, but it rises more slowly, and in the long run it is little different. Indeed some plausible assumption there is no difference at any time. There are two basic assumptions: (1) The current price is the long run competitive price, plus an error of estimate. A drop in the current price merely shows that

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33 Hubbard and Weiner (1986), for instance, use this Distinction in their Analysis of the Optimal draw down Decision of a Strategic Oil Stockpile.
the starting level was too high, an error now corrected. (2) The long run competitive price must rise because of inherent growing scarcity. Both assumptions are wrong.\textsuperscript{36} The price has no relation to scarcity, present or future. Long-term marginal cost, even with an excessive allowance for resources rent or user cost, remain a small fraction of the price. To support that price, the excess supply is restricted by a cartel. This creates constant tension, hence the volatility since 1970s.

The essential difference: in manufacturing, the inventory of input materials is on the average about six weeks' production. In oil, the rough rule of thumb optimum for proven reserves is fifteen years. The industry spends billions of dollars every year to replenish the inventory. Replacement cost is the measure of scarcity. There are no fixed stocks of resources, only flows of reserves additions. If the cost of locating and extracting minerals for inventory exceeds the expected market price, investment dries up and the industry disappears. What's left in the ground is unknown, an economic zero. There is no such thing as 'limited resources'. The amount of any mineral in the earth is an irrelevant non-binding constraint. We cannot rescue the concept of a fixed mineral stock by making it 'the economic portion' of the unknown total in the ground. This is circular reasoning. For the 'economic portion' depends on future costs and prices. One cannot estimate costs and prices by starting with their result. The 'economic portion' is a forecast; an implicit unverifiable prediction of how much inventory will be worth creating and using. Estimates of 'ultimate production' are useful only to expose varying assumption on incidence and cost.\textsuperscript{37}

The assumption of an initial fixed mineral stock is not only wrong but also unnecessary. All else being, the replacement cost of any mineral should constantly increase over time, and the price with it. First, the average size of newfound deposits should constantly decrease. The biggest would be found first even by chance, let alone by design. Second, the better, i.e. lower cost mineral should be used up first. Yet prices of minerals have not risen. Practically all have been flat or actually declining in the long run.\textsuperscript{38} The argument among econometricians is whether we must reject or accept a long-term downward trend for minerals prices. Long-term increase is not even in question. All else has not been equal. Mineral depletion is in fact an endless tug-of-war: diminishing returns versus increasing knowledge.

In a functioning competitive market, scarcity is measured by price, which equals incremental cost, including an allowance for the sacrifice of better ore used now and lost for the future. This 'user cost' is


\textsuperscript{38}"For Commodity Producers, (1991) was another Dismal Year? (Prices Ended at) the Lowest Level in real terms since this Newspaper began Calculating an all-item Commodity Price Index in 1845", "Incommodious Commodities", (London Economist), January 11, 1992, p.66.
captured by changes in the development cost per unit of newly added reserves or per unit of new
capacity, and by the value of reserves already developed. The price increases since 1970 have no
connection with increased scarcity, and must therefore be due to market control. Sellers’ behavior
confirms this. The higher-cost producers sell all they can produce; the low-cost producers produce only
what they can sell at current prices, and cut back production to match demand. The sharp investment
cutbacks in the lowest cost areas, and expansion in the higher cost, fit the same picture, of output
restricted to maintain prices.39

The OPEC member nations are the lowest cost producers but the supplies of last resort: price
makes where the others are price takers. To model the restricting group, emphasis must be on their
investment behavior, which determines capacity. Treating capacity as an exogenous variable ignores
what is most important. Some models have governments making oil production decisions for non­
economic reasons. This confusion means either ends, and getting with spending. A state first is to
survive; than, to cultivate its garden, or spread the true faith, or to beat its neighbours, or anything else.
But whatever is the objectives the more wealth the better. A state that deliberately avoids wealth
maximizing is a special story, which had better be a good one. There is no authentic example. The price
target informally set in 1973, then more explicitly by the long-term price policy committee of OPEC in
1973-80, was the cost of synthetic liquid fuels. That is clear example of monopoly profit maximizing.
For only when oil no longer competes with oil can its market price approach the supply price of the
nearest alternatives. But those in high office in the consuming countries want to believe in non­
economic objectives in the producing countries. If producing government’s produces less oil than would
clear the market, the allocation takes place by these governments’ grace and favour. ‘Special
relationship’ will help obtain ‘access’ to oil, and security. Masterly diplomacy, firm yet conciliatory,
assures ‘access’. And of course the public wants to believe they have some say in deciding the sauce in
which they are to be eaten.40

World oil market models have been developed for a variety of purposes. Economists have built
models to test theories about the structure of the market such as whether OPEC is in fact acting as a
cartel. And the other set of models specified the structure of the market and attempted to evaluate
various government polices, such as import tariffs or strategic stockpiles. Yet another set of models was
constructed for forecasting future oil prices, supplies and demands.41 Two distinct paradigms dominate
world oil market modeling. One is the intertemporal optimization approach, in which decision makers
are assumed to attempt to optimize some measures of their wealth over time. The other is the behavioral

simulation approach, in which decision makers do not explicitly optimize but use rules of thumb based on currently available information. But simply, the intellectual origins of the intertemporal optimization approach can be found in natural resources economics, while the origins of the behavioral simulation approach lie in system dynamics. Each approach has its proponents and detractors. It is probably fair to say that the early proponents of the optimization approach have been somewhat chastened by the erratic evolution of the market and the large deviations between the predictions of their models and reality. Compare, for two example, the following two statements by Pindyck, which were separated in time by the price doubling of 1978-79: 1. OPEC’s behavior is surprisingly predictable, since the cartel is most likely to take only those actions that are in its best economic interests... it makes most sense then, to adjust the price so that it always maximizes the flow over time of all current and discounted future revenues. 2. The real world is not as rational and dynamically optimal as economists would like to believe. And, economic rationality probably applies even less to OPEC produces than to many other real world economic agents.

A comparison and evaluation of the behavioral simulation and optimization approaches to oil market modeling is beyond the scope of this section. Rather, the purpose is to evaluate the dominant behavioral simulation model of OPEC, the so-called target capacity Utilization Model (TCU). The TCU model is a simple behavioral rule that links OPEC’s price (assumed to be decision variable) with two other easily observable variables: OPEC production and OPEC capacity. The TCU model is specified somewhat differently in different models, but all versions are based on the idea that at high rates of capacity utilization OPEC will raise its price dramatically, while at low rates of utilization it will lower its price slowly.

Oil and security head and list of US interests in the Gulf and the two are obviously interconnected. Broadly what is meant by security is to maintenance of a political order conducive to US access to the region’s oil supplies markets and communication routes and protection of related US investment and assets. The United States is the biggest consumer of oil in the world accounting for 25% of current world consumption, and only 7.7% of world production. A steadily declining crude oil production in the US coupled with steeply rising costs of finding and developing new oilfields, have combined to create a major oil deficit in the country’s oil balance forcing it to become increasingly dependent on oil imports and this dependence is set to increase. In 2000 the US imported 56% of its needs, or 11.07 million barrels Persian Gulf oil is once again asserting its position as a strategic commodity not only because it is the fuel for the most dramatic economic growth in the world but also because its access and use are becoming intimately intertwined with national security and power. As we

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enter the new millennium, two very powerful geopolitical factors will decisively determine whether the quest for Persian Gulf oil could enhance the global oil security and, therefore, usher in a period of growth and interdependence in the global economy or could lead to oil supply disruption and also instability and conflict in the Asia-Pacific region. The two factors are the United States growing dependence on oil imports, particularly from the Persian Gulf and the Asia-Pacific region's thirst for oil and the increasingly likely Chinese dependence on oil from the region.\textsuperscript{43} So a new US versus Asia Pacific scenario begins to emerge, which links global oil security to oil geopolitics in the Persian Gulf and the Asia-Pacific regions, the question is can these two issues be reconciled, a day (mbd), almost half of which came from the Persian Gulf. By the year 2010, the United States could be importing 79\% of its oil needs, two-thirds of which will also come from the Persian Gulf. (See Tables 4.1 and 4.2).

Table 4.1: US Current and Projected Crude Oil Production, Consumption and Imports, 1996-2010 ('000 b/d)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Production</td>
<td>6470</td>
<td>6250</td>
<td>6000</td>
<td>5890</td>
<td>5563</td>
<td>5517</td>
<td>5281</td>
<td>4735</td>
<td>-27</td>
</tr>
<tr>
<td>Consumption</td>
<td>18,310</td>
<td>18,920</td>
<td>19,330</td>
<td>19,760</td>
<td>20,139</td>
<td>20,748</td>
<td>21,375</td>
<td>23,027</td>
<td>+26</td>
</tr>
<tr>
<td>Total imports</td>
<td>9400</td>
<td>10,380</td>
<td>10,550</td>
<td>11,070</td>
<td>14,376</td>
<td>15,231</td>
<td>16,094</td>
<td>18,292</td>
<td>+95</td>
</tr>
</tbody>
</table>


Table 4.2: Oil Demand: North America and Europe versus Asia-Pacific, 1992-2010 ('000b/d)

<table>
<thead>
<tr>
<th></th>
<th>1992\textsuperscript{a}</th>
<th>1998</th>
<th>1999</th>
<th>2000</th>
<th>2001</th>
<th>2003</th>
<th>2005</th>
<th>2010</th>
<th>% Change 1992-2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>North America</td>
<td>19,430</td>
<td>21,620</td>
<td>22,070</td>
<td>22,500</td>
<td>22,930</td>
<td>23,820</td>
<td>24,821</td>
<td>27,511</td>
<td>+42</td>
</tr>
<tr>
<td>Europe</td>
<td>15,040</td>
<td>16,080</td>
<td>15,990</td>
<td>16,130</td>
<td>16,280</td>
<td>16,570</td>
<td>16,860</td>
<td>17,606</td>
<td>+17</td>
</tr>
<tr>
<td>Asia-Pacific</td>
<td>15,280</td>
<td>19,200</td>
<td>19,920</td>
<td>20,780</td>
<td>21,690</td>
<td>23,870</td>
<td>25,570</td>
<td>29,499</td>
<td>+93</td>
</tr>
</tbody>
</table>


\textsuperscript{a} The year the Asia-Pacific region overtook Europe in oil consumption.

Table 4.3: Current and Projected Crude Oil Demand, Supply and Imports in the Asia-Pacific region, 1998-2010 (’000 b/d)

<table>
<thead>
<tr>
<th>Year</th>
<th>1998</th>
<th>1999</th>
<th>2000</th>
<th>2001</th>
<th>2003</th>
<th>2005</th>
<th>2010</th>
<th>% Change 1998-2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Production</td>
<td>6960</td>
<td>6910</td>
<td>6860</td>
<td>6809</td>
<td>6713</td>
<td>6620</td>
<td>6200</td>
<td>-11</td>
</tr>
<tr>
<td>Consumption</td>
<td>19,200</td>
<td>19,920</td>
<td>20,780</td>
<td>21,690</td>
<td>23,870</td>
<td>25,570</td>
<td>29,499</td>
<td>+54</td>
</tr>
<tr>
<td>Net Imports</td>
<td>11,950</td>
<td>13,230</td>
<td>13,920</td>
<td>14,881</td>
<td>17,157</td>
<td>18,950</td>
<td>23,299</td>
<td>+95</td>
</tr>
</tbody>
</table>

Source: BP Amoco Statistical Review/ US DOE/ Institute of Energy Economics, Japan (IEEJ)/IEA

The 'centre of gravity' of oil consumption is really shifting to the Asia-Pacific region. In 1992 the region overtook Europe in oil consumption and if the oil demand trend visible in the region continue into the future, the Asia-Pacific is projected to overtake North America including Mexico by 2003 to become the world’s biggest consumer of crude oil see table 3. By 2010 the Asia-Pacific region will be the world’s largest consumer of primary energy. The region already imports 69% of its needs, or 14.88 mbd, three-quarters of which come from the Persian Gulf and Asia’s dependence on this volatile region is sharply increasing. By 2010, Asia-Pacific could be importing 79% of its oil needs, some 95% of which will also come from the Persian Gulf see table 4. The Asia-Pacific countries are increasingly growing concerned about their ability to obtain enough oil to fuel future economic growth. Nowhere are these concerns as manifest as in China. An economic and strategic watershed was reached in 1993 when China, then the world’s sixth largest oil producer, became a net oil importer, leading many analysts to ponder on the implications of this development.44

China’s spectacular economic growth has led to a growing dependence on oil imports which in 2000 amounted to an estimated 1.4 mbd, or 30% of its needs, with imports from the Persian Gulf accounting for 31% of the total and this trend is set to continue into the future. By 2005 China will need to import 3.63 mbd, or 60% of its needs, rising by 2010 to 6.35 mbd, or 76% of its needs. By then China would have overtaken Japan to become the world’s second largest oil importer after the United States (See Table 4.4).

### Table 4.4: China's Production, Consumption and Net Oil Importers 1993-2010 ('000 b/d)

<table>
<thead>
<tr>
<th></th>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Production</td>
<td>2890</td>
<td>3198</td>
<td>3195</td>
<td>3182</td>
<td>3039</td>
<td>2470</td>
<td>2000</td>
<td>-31</td>
</tr>
<tr>
<td>Consumption</td>
<td>2920</td>
<td>4160</td>
<td>4370</td>
<td>4600</td>
<td>4858</td>
<td>6100</td>
<td>8350</td>
<td>-186</td>
</tr>
<tr>
<td>Net Imports</td>
<td>30</td>
<td>962</td>
<td>1175</td>
<td>1418</td>
<td>1819</td>
<td>3630</td>
<td>6350</td>
<td>-560</td>
</tr>
</tbody>
</table>


* The Year China became a net oil importer.

### Table 4.5: Global Crude Oil Reserves Additions, 1992-1999* (bn barrels)

<table>
<thead>
<tr>
<th>Year</th>
<th>Added in year</th>
<th>% Of annual production</th>
</tr>
</thead>
<tbody>
<tr>
<td>1992</td>
<td>7.80</td>
<td>33</td>
</tr>
<tr>
<td>1993</td>
<td>4.00</td>
<td>17</td>
</tr>
<tr>
<td>1994</td>
<td>6.95</td>
<td>28</td>
</tr>
<tr>
<td>1995</td>
<td>5.62</td>
<td>23</td>
</tr>
<tr>
<td>1996</td>
<td>5.24</td>
<td>21</td>
</tr>
<tr>
<td>1997</td>
<td>5.92</td>
<td>22</td>
</tr>
<tr>
<td>1998</td>
<td>7.60</td>
<td>28</td>
</tr>
<tr>
<td>1999</td>
<td>13.00</td>
<td>48</td>
</tr>
<tr>
<td>1992-1999</td>
<td>56.13</td>
<td>27</td>
</tr>
<tr>
<td>Annual average</td>
<td>7.00</td>
<td>26</td>
</tr>
</tbody>
</table>


* Data for world, excluding the US and Canada.

There is a perceived geopolitical very important to falsify a political and commercial partnership with the three largest leviathans of crude oil supply Saudi Arabia, Iran and Iraq. Oil from the Persian Gulf is vital to China's economic development status depend heavily on its Persian Gulf oil. However, China's
potential exposure to economic dependence and to the political turbulence of the Persian Gulf touches a very raw nerve in its strategic thinking.\textsuperscript{45}

The Asia-Pacific region’s phenomenal economic growth up to July, 1997 and its economic recovery since then, its steadily rising energy needs and its resulting impact on world energy markets, lend urgency to the question of how the region would meet its considerable energy challenges. Until the mid-1990s, energy security did not figure prominently in the thinking about the ‘future of Asian security’. Instead, it focused on flashpoints such as the Korean Peninsula, the Taiwan Strait, and by mid-1990s, concern over the strategic implications of an emerging China. Apart from tensions over the disputed Spratly Islands in the South China Sea with alleged, but unproven, oil and gas reserves, energy did not the pure volume of Asia security scale, despite the region’s negative energy balance. Only gradually did the sheer volume of Asia-Pacific’s real and projected energy needs and their intersections with security issues, start to features prominently in dialogue about the future of the Pacific.\textsuperscript{46} The US Energy Information Agency (IEA) predicts in its ‘International Energy Outlook 1999’ that by 2020 the Asia-Pacific’s oil demand will grow by 2-3 times more rapidly than that of the Industrialized West assuming oil prices will average $15-$20 per barrel (in 2000 US dollar) (Energy Information Agency, International Energy Outlook, 1999). Demand growth of this order is comparable to the pattern of the previous quarter-century, when Asian energy demand grew by an average annual rate of 11.4% over the period 1970-94 compared to 2.6% in the rest of the world.\textsuperscript{47}

The dominant trend in the Asia-Pacific region is one of growing oil dependence on the Persian Gulf. This lends urgency to the question of how the various Asian countries would handle their respective reliance on energy imports. Where would some 29.5 mbd that the Asia-Pacific region is projected to need by 2010 come from, and how would such demand affect world oil markets, energy security, and, not least, the price of oil. In the current transparent and increasingly globalized oil markets, oil commerce has come to be shaped by transport costs rather than political relationships. As a result, a two-forked global oil market has emerged: oil supplies from the Persian Gulf gravitating to the Asia-Pacific region, while supplier from the Western Hemisphere, Mexico, Venezuela, Canada and Colombia and the Atlantic Basin the North Sea and West Africa heading towards the US market. Indeed, the Asia-Pacific region is likely to take some 95% of its total oil imports from the Persian Gulf by 2010.\textsuperscript{48}

The strategic significance of new energy linkages between two potentially turbulent regions has not been delineated. Would it principally remain a benign commercial relationship, or could it


fundamentally challenge the prevailing US dominated political order. What are its geopolitical implications for Gulf security, for Asia-Pacific security and for the US role in both regions. The implications for the Persian Gulf Asia oil connection are evident. Both sides are keenly aware of their respective imperatives: the need to ensure customers on the part of Gulf/Persian Gulf exporters; and the need to ensure oil supplies on the Asian side. Asian are investing in upstream oil and gas sectors in the Persian Gulf, while Persian Gulf exporters are investing in downstream Asian activities. But clearly, as the oil and gas relationship with Asia expands over the coming decades, there will be an enormous volume of capital flows into the Gulf producers by 2010, estimated by some accounts at $161 bn annually and growing. This is based on imports of some 22 mbd from the Persian Gulf by 2010 at $20/b.

While such capital flows could, in part, be recycled into downstream investment in dynamic Asian economies and would go some distance towards tackling a growing list of social and economic problems in major Gulf-oil exporting countries such as Saudi Arabia, Iraq and Iran, they could, by the same token, also accelerate efforts to obtain a new cycle of modern weapons, including nuclear and missile technology. 49

Geoeconomic or Geostrategic Dimension

With the end of the Cold war and the Gulf war, the United States has emerged as the pre-eminent external power in the Gulf region. This factor has helped the United States and the Group of seven (G-7) states gain a substantial degree of oil security. The US position in the Gulf also helps it to prevent the rise of another global rival. And should one arise. Washington's position would be a great advantage given China's and Japan's thirst for Gulf oil. While it is conceivable that in a future crisis situation between the US and China over Taiwan, the US may arrange a supply embargo on China from the Gulf, it is improbable that a crisis situation that a crisis situation could arise with Japan, which could prompt the US to disrupt supplies to it from the Gulf. However, oil has tendency to confound expectations. In 1940, it was energy security that led Japan to occupy the Dutch East Indies and take control of its oilfields. Indeed, the US oil embargo was an important factor leading Japan to attack Pearl Harbor, bringing the US into the Second World War. Some analysts see in China, a rising power with a newfound repetition of these experiences. The problem for Asia-Pacific stability, growing with each barrel of Chinese oil imports, is now clear. It is the danger that China's attempts to safeguard its oil supply lanes and defend its historical sovereignty its oil adjacent seas poses for other nations, especially Japan, China claims 80% of the South China Sea as territorial waters. Some 70% of Japan's oil supplies pass that way. 50


Thus as Chinese imports steadily rise, defending the oil supply routes becomes a new security imperative for China. The Asia-Pacific’s thirst for oil could increase the likelihood of conflict over territory. How Asia-Pacific Countries, particularly China and Japan, define energy security will, however, help determine whether they deal with this issue in a geoeconomics rather than geostrategic terms. Although such dependence on a volatile region like the Persian Gulf and the perception of scarcer energy resources in the Asia-Pacific region, have the potential to lead to conflict in both regions, such potential conflicts can, however, be resolved not by force but through markets and investment within an increasingly globalized international commerce. Market forces have increasingly proved to be essential to resolving energy questions by spurring conservation, energy efficiency and the development of new oil and alternative energy resources. Furthermore, mobilizing the massive financial resources needed for energy infrastructure in the Asia-Pacific region alone, estimated at over $1 trillion over the next decades, warrants greater priority than asserting claims by force to territories or islands with unproved oil or gas reserves. From this geoeconomics perspective, commerce and market forces shape inter-state relations, and not vice-versa. 51 In the final analysis, the most likely threat to energy security is one of short-term disruption. However, energy cooperation by the Asia-Pacific nations, increased energy efficiency, diversification of energy sources and the creation of an Asian strategic petroleum reserves, would provide the answer to oil supply disruptions. For now, it suffices to note that the emerging economic relationship between the Persian Gulf and the Asia-Pacific region has become a central reality in world energy markets.

Asia-Pacific and to Oil Security

Many Asia-Pacific economies are formulating and implementing a wide variety of security polices in response to their sharply growing oil demand and imports. These policies range from the promotion of alternative energy development and use to diversification of oil import sources and reciprocal investment in upstream and downstream energy sectors. 52 With ample natural gas reserves in the Asia-Pacific region, natural gas introduction is actively promoted by many Asia-Pacific economies a large number of natural gas development projects LNG projects have already gone ahead to tap local resources). Coal development and use is also being promoted by many Asia-Pacific economies. Coal, abundant in the region, has become the principal energy source for many economies. However, because of it’s adverse environment impact, top priority is given to the promotion of ‘clean coal technologies’ to enable efficient use of coal, particularly in China, the largest coal producer and consumer. Another pillar of alternative

energy development among the Asia-Pacific economies is nuclear power generation. In the Asia-Pacific economies, nuclear power has been chosen as one of the principal alternatives, with nuclear plant construction continuing to date. The Asian economies with nuclear power plants in operation are Japan, China, South Korea and Taiwan. The combined nuclear power plant capacity of these four countries currently stands at 66.02 million Kw with 21.93 million Kw under construction.\(^{53}\)

The growing dependence of the United States and the Asia-Pacific region on Persian Gulf oil will exert an upward pressure on the price of oil and will impact on global oil supplies, as the bulk of the global supplies during the next two decades will come from the Persian Gulf. Robust global economic growth has caused the global oil demand to increase significantly, particularly in the United States and the Asia-Pacific region. The global economy grew last year at an estimated 4.75% and is projected to grow this year at 3.9% according to the International Monetary Fund (IMF). This has fuelled a 2.4% rise in global oil demand in 2000 and a projected 2.6% in 2001.\(^{54}\) The Asia-Pacific region’s 10 key economies, including Japan, are reported to have used 7.6% more oil in 2000, than in 1999. In the nine economies other than Japan, whose economy remains sluggish, oil consumption climbed nearly 11% last year. The International Energy Agency (IEA) and the US Department of Energy (DOE) forecast that global oil demand would grow this year from 76.2 mbd in 2000 to 78.1 mbd rising to 83.9 mbd in 2005 and 93.5 mbd in 2010 with Persian Gulf producers having to meet the major part of the additional demand.

However, this will depend on the necessary investment being made to expand production capacity see Table 4.6. The capital costs of maintaining and expanding production capacity of the big five producers in the Persian Gulf is Saudi Arabia, Iran, Iraq, UAE and Kuwait over the period of 2000-2005 are estimated at $63.56 bn. This projected figure is based on the five countries planned capacity increase from 20 to 26 mbd by 2005.Oil supply from non-OPEC producers is expected to start a slow decline between now and 2005. Oil supply from Persian Gulf producers is projected to peak by around 2013. Since the total conventional oil supply will not be able to fully match demand, additional supplies of liquid fuels are expected to become available from non-conventional sources. By 2010, global demand is projected to rise to 93.5 mbd with Persian Gulf producers accounting for 50%, or 46.7 mbd, and non-OPEC producers providing 43.9 mbd of which 8.9 mbd is supposed to come from non-conventional sources, rising to 20 mbd in 2014 and 80 mbd by 2030.\(^{55}\) This is not only an exceptionally daunting task, but virtually impossible.

\(^{53}\) Data from Institute of Energy Economics, (Japan).


The world is currently consuming almost 28 billion barrels (bb) of oil a year on an arising trend, yet finding 7 bb/year, on average. The total global reserves addition of 13 bb in 1999 as much better than in recent years, but still represents only 48% of the 27 bb produced in 1999. Over the period 1992-1999 only 26% of global oil production has been replaced by new discoveries see table 7. This means that the Persian Gulf producers with 65% of the world’s proven reserves and just over one-third of global production, will assume a clear cut leadership of the supply side of the market. In the major gulf oil-producing countries, both exploration and investment in capacity expansion are down to minimum because of declining revenues from oil exports over the past two years and widening budget deficits.\textsuperscript{56}

However, whatever action is taken on the oil price must accommodate the reality that there are inherently destabilizing forces in the oil market that the goal of price stability may be largely unachievable. The ‘normal’ oil market is marked by highly inelastic supply. Demand is also inelastic. Prices thus are highly volatile. It is why the oil market has depended upon stabilizing institutions the Seven Sisters and OPEC itself.\textsuperscript{57} How high will the prices rise? The answer is anybody’s guess. Prices have already risen by 200% from $10/b to $30/b since March 1999. It is unlikely that they could rise to or above $50/b. however, high oil prices are projected to become a feature of the global oil market during the coming years, underpinned by the healthy state of the global economy, a growing global oil demand a widening gap between global demand and production capacity, declining discovery rates of new oil and a gradual decline in non-OPEC production. Oil prices are projected to range from $25/b to $32/b for the foreseeable future. The growing dependence on Persian Gulf oil by the United States and the Asia-Pacific region over the next two decades will impact directly on the global oil supplies, the price of oil and energy security. Such dependence on a volatile region like the Persian Gulf and the perception of scarcer energy resources in the Asia-Pacific, have the potential to undermine global energy security and lead to conflict in both regions unless they are dealt with in geoconomics rather than geostrategic terms.

\textsuperscript{56} The Organization of Petroleum Exporting Countries (OPEC). Annual Review and Record. (Vienna, 1968).
Potential conflicts can, however, be resolved not by force but through markets and investment and that mobilizing the massive financial resources needed for energy infrastructure in the Asia-Pacific region alone, estimated at over $1 trillion over the next decade, warrants a greater priority than asserting claims to territories or island with unproven oil or gas reserves. The concentration of the global oil supplies in the Persian Gulf coupled with declining supplies from outside the region will undoubtedly exert an upward pressure on the price of oil and that high oil prices are projected to become a feature of the global oil market during the next two decades. The tragic events of the 11th of September 2001 in the United States have significantly altered the outlook for the global economic growth and the global demand for oil. The US economy has been slowing down since November last year but these events have pushed it into recession and also slowed down the global economic growth.  

We have argued when security of supply is understood as the assurance of the physical availability of oil supplies, achieving this goal can easily be implemented alongside polices pursuing a general objective of reducing the macroeconomic costs of oil shocks. However, by its very nature, achieving security of oil supply is then a goal, which is operative only in the very short run. Broadening the notion of security of supply to target both a given quantity of oil and a given price makes achieving

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Table 4.6: Global Crude Oil Reserves Additions, 1992-1999a (bn barrels)

<table>
<thead>
<tr>
<th>Year</th>
<th>Added in year</th>
<th>% of annual production</th>
</tr>
</thead>
<tbody>
<tr>
<td>1992</td>
<td>7.80</td>
<td>33</td>
</tr>
<tr>
<td>1993</td>
<td>4.00</td>
<td>17</td>
</tr>
<tr>
<td>1994</td>
<td>6.95</td>
<td>28</td>
</tr>
<tr>
<td>1995</td>
<td>5.62</td>
<td>23</td>
</tr>
<tr>
<td>1996</td>
<td>5.24</td>
<td>21</td>
</tr>
<tr>
<td>1997</td>
<td>5.92</td>
<td>22</td>
</tr>
<tr>
<td>1998</td>
<td>7.60</td>
<td>28</td>
</tr>
<tr>
<td>1999</td>
<td>13.00</td>
<td>48</td>
</tr>
<tr>
<td>1992-1999</td>
<td>56.13</td>
<td>27</td>
</tr>
<tr>
<td>Annual average</td>
<td>7.00</td>
<td>26</td>
</tr>
</tbody>
</table>


* Data for world, excluding the US and Canada.

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security of oil supply indistinguishable from the general policy objective outlined above. Further, we have maintained that this objective is also in essence a short-run. In the long run, either this objective is not feasible, or the consequences of the proposed remedy may well be worse than the disease itself.

This raises the important question of how the energy policy objective of insulating an economy from shocks can be achieved when the shock is strategic, so that its effects persist in the long run. Within this context, we must also ask whether the conception of security of supply can be adapted to such a long-run view. We have argued that the effects of a strategic shock are triggered by the increase in the world price of oil, and that the important consequences are a function of both the magnitude of the price rise itself and the importance of oil as an input in the domestic economy under consideration. Given that this is either infeasible or prohibitively costly to maintain a wedge between domestic and world price in the long run, then decreasing the demand for oil can only soften the effects of a strategic shock. Such policy action, by its very nature, is preventive, by opposition to being corrective. Indeed, over the duration of the strategic shock, the persistence of the oil price increase would, in and of itself, induce agents to substitute away from oil and toward other energy inputs, thereby decreasing the demand for oil. Therefore, government intervention is required when it is beneficial to affect such a shift in demand as a preventive measure against its macroeconomic effects, and when individual agents cannot be expected to change their choice of energy source before the advent of a shock. If the government assesses that this preventive measure should be implemented, but consumers and firms do not have the incentives to decrease their use of oil in the absence of government intervention, then this would imply that the public and private evaluation of the net benefits of such actions diverge. Indeed, the fact that there may exist gains from a collective decrease in the demand for oil does not imply that an agent would find it optimal to substitute away from oil regardless of the actions of other agents on the market. For instance, a firm may increase its short-run costs, and worsen its position in comparison with its competitors in a given market, if it is the only one adopting a new technology less intensive in oil. 59

The institution of import restriction, tariffs, or other government actions elevating the domestic price above world-equivalent levels would decrease the quantity of oil demanded. However, policy measures of this type would have to be in place for a long period of time eventually to induce an inward shift of the domestic demand curve for oil. The fact that there is no ready mechanism through which a domestic government can credibly commit to maintain such policies beyond its stay in power means that a development of this type is not likely to occur. 60

It does not follow, however, from the fact that demand management polices can have a measurable effect, that their implementation should be advocated. The inward shift of the demand curve

and the associated lower oil consumption levels that such policies would seek to induce could only be achieved at some cost. In particular, not only would implementation costs need to be considered, but so would the opportunity cost of the distortions in the distribution of economic activity brought about by the enactment of these measures in anticipation of future oil shocks. Consider, for example, the case of public investment in the research and development of alternative energy forms. The resulting expenditure streams would certainly draw resources from other uses; however, the output of these activities is, by its very nature, uncertain. Any assessment of the usefulness of such policy initiatives would need to weight their up-front costs against their uncertain results in moderating the domestic consequences of future oil shocks.  

Given that pursuing the general objective of insulating a domestic economy from the macroeconomic effects of shocks must, in the long run, operate on the demand side of the market, it seems difficult to identify a policy goal, which could properly be termed security of supply. Further, given that security of supply can be well defined in a short-run context, this identification of demand-side initiatives with supply-side considerations seems only to confuse the issue. In the literature, however, this separation between long-run and the short-run objectives is often not made, so that polices that we could characterize as demand management initiatives have frequently been lumped together with other security polices. For example, (Toman), includes, without necessary advocating their implementation, a number of demand-side measures (e.g., subsidies to encourages fuel-switching and support for the development of alternative energy sources) in his analysis of policy initiatives aimed at promoting energy security.

Oil Shocks and Impact on India
The near doubling of India's petroleum imports over the past oil crisis years can be explained by these institutional factors:

1. Stagnation in the domestic oil industry. 2. Lack of infrastructure of natural gas technology. 3. Delays in planned completion and operation of nuclear-powered plants for electric utilities. 4. Technological problems encountered in the development of sulphur control equipment for coal and oil burning equipment. 5. Environmental and safety concerns. 6. Problem of payments. 7. Lack of Comprehensive policy. 8. In crisis situation no alternative source of energy is available in outside.

Indian policy based on a preference for limiting dependence upon any one nation for a vital commodity, some concerns for maintaining some level of viability for domestic petroleum industry, and a desire to maintain a high degree of self-sufficiency in all areas that might effect the nation's economy or military security. However, this policy appeared no longer viable after 1973 in the face of increased demands for petroleum and decreased domestic production. India does not have the option of relying on domestic sources of petroleum, nor are alternative sources of energy commercially feasible. India has

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always imports about 70% of its total petroleum needs. Today the figure is close to more than 70%. One, logic behind diversification was that India dependent upon imported oil ought not weaken its position further by becoming reliant upon any one exporter. By expanding its sources of imports, it could reduce the risk of impeded access to these critical resources. This strategy emerged with the entry of new producers into the world petroleum market and was viable as long as an India was confronted with a large number of relatively autonomous, uncoordinated exporters. For India to reduce reliance successfully on any single supplier, one or more of the following conditions must hold: 1. There must be a large number of uncoordinated exporters. 2. They must have the capacity to meet a consumer policy of diversification. 3. Consumers must be able to accommodate different petroleum grades. 4. Consumer’s demands must be sufficiently elastic to accommodate transportation costs.\(^{62}\)

For exporting countries, only major producers could selectively pursue a similar policy of diversification. The smaller exporters Algeria, Libya, Indonesia, the United Arab Emirates, Nigeria, Qatar tended to follow a pattern of export concentration. Such a policy is effectively not allowed for the larger producers Saudi Arabia, Kuwait, and Iran. The magnitudes of their exports are such that they readily, if not automatically, accommodate to diversification by the imports. The irony, however, is that consumer attempts to diversify, which may have been predicated on the desire to reduce dependence on single suppliers, have reinforced the bargaining position of all producers. The size of the import bill for petroleum is a clear indicator of the monetary impact of the past and present energy situation. It is estimated that if petroleum consumption does not decline appreciably due to the increased prices cumulative payments for petroleum may reach at least billion of dollar. While the precise magnitudes are subject to debates, they are large enough to strain the capacities of the Indian monetary system. Indeed, the question of financial instability might be the most severe problem resulting from current energy transactions.\(^{63}\)

Therefore, two years of oil payments could deplete all financial reserves. This is an extremely simplistic view since it ignores growth in reserves, any notion of credit, and the magnitude of factors influencing both oil bills and monetary reserves. Nonetheless, it is conventionally believe that if compensatory policies were not agreed upon long before this point is attained, the development of large-scale monetary dislocations, of which the loss of purchasing power of major currencies may only be a minor feature, would develop. The magnitude of the large transfers of wealth after 1973 has begun to distort the Indian existing exchange relationship among currencies.\(^{64}\) Acceptance by the oil-exporting

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states of a particular currency serves to strength it in relation to others, and accumulation of their stocks of
currency may distort financial markets far in excess of any perturbation yet experienced by industrial
economies. For example, reports in December of 1974 that Saudi Arabia was no longer willing to accept
payments in sterling effectively devalued the Britain pound, forcing the Bank of England to allocate an
estimated $250 million of its currency. Two distinct, but related, financial problems arise as a
consequence of the rise of petroleum prices. Pertains to the ability of OPEC countries to absorb
enough imports from the oil consuming referred to as primary recycling. 2. Pertains to the differential re-
entry of petroleum revenue in the economies of the oil-consuming nations because high-risk countries,
such as India, do not attract the investment of surplus revenues. This problem is referred to as secondary
recycling. The first problem may be a question of time. The second is a question of unevenness.
Secondary recycling is problematic only if primary recycling is not well handled.

The difficulties that did occur the international management system problems associated with
inflation, restrictive monetary policies, and rising rates of interest, rather than to the massive inflows of
petroleum revenues. India increases their exports to the oil-producing countries in order to protect their
own currency. Such competition would place obstacles in any consumer efforts to devise institutionalized
means of accommodating to the requisites of secondary recycling. The consequences of the transfers of
funds lie beyond the direct influence of any single nation and reflect interrelated predicaments. The oil-
consuming countries' trade deficits become the oil-producing countries financial surpluses. OPEC
decision to produce more petroleum than is required to pay for imports of goods and services. As long as
the oil-exporting states continue to meet the petroleum requirements of the consumer countries at present
or higher prices, recycling problems will persist. Today, the Arab oil-exporting alone control 4.4% of the
world's monetary reserves; they have 1% of the world's population, and their per capita monetary
reserves range from 1 to 20 times those of the United States. The Persian Gulf is becoming the world's
most rapidly growing store of capital. This nearly total dependence of the oil-exporting countries upon
petroleum revenues is often compared of the importance of petroleum in the economies of the industrial
countries. However, the problem of adjusting to a potential absence of critical resources is quite different
for oil-exporters and for oil-importers. For the Indian huge, population size and rate of change, level of
economic development, alternative sources of revenue, and priorities in economic policy together
determine their dependence on petroleum. For some importers, this dependence will persists as long as
alternative sources of energy are not commercially viable.

The less-developed countries are unevenly affected by the price increases. The richer members
will suffer the same problems facing the advanced industrial societies; the effect may be temporary. But

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65 OPEC. The Oil Industry's Organization in the Middle East and Some of its Fiscal Consequences, by F.R. Parra. (Geneva,
Indian development prospects are most severely affected may well suffered enduring setback. It is labeled the "Fourth World" country. Increase in petroleum prices accentuate economic problems in Indian economy have strong multiplier effects upon their development difficulties. The food crisis, for example, does not reflect actual shortage, except in some areas. India relies on foreign imports to meet their food and fertilizer needs cheaply, and government has overestimated the productive capacity of the "green revolution". The emergence of the Fourth world another still poorer group of nations creates further cleavages in the international system and new hierarchies of poverty and inequalities. The Fourth world is dependent upon decisions made elsewhere. It cannot exert a direct influence on the direction or nature of evolving policies, nor does it have any substantial power to shape the priorities of the oil-exporters or the major consumers.67

Several options in response to evolving economic interdependencies are available to both oil-importers and oil-exporters. Each option is accompanied by gains and losses and each involves a different set of policy instruments and different time horizons. For example, India may seek to: 1. Reduce their consumption of petroleum. The reduction of petroleum consumption by the importing nations is largely a long-term policy. 2. Promote their exports to the oil-producers in order to offset financial deficits. 3. Reduce capital outflows to non-OPEC nations and encourage compensating capital inflows from OPEC. 4. Devaluate national currency. 5. Invest in the economies of the oil-exporting states. 6. Develop collaborative financial policies among oil-importing nations.68

Currency devaluation is a discrete financial adjustment not a long-term policy. In theory, any individual country could undertake monetary adjustments equal to the overall trade deficit, taking into account long-term capital inflows, private as well as public. The possibility of devaluations of such magnitude may increase incentives for collaborative arrangements among oil-importing nations and for the development of joint monetary policies at least within the OECD. OPEC is concerned with the value of petroleum and not intrinsically with currency arrangements among Western countries. Devaluation would enable OPEC to buy more goods and services from the West, but the oil-exporting countries are likely to oppose such a move, since it would reduce the value of their own monetary reserves. In addition, if OPEC reacts to devaluation by initiating further price increases greater than the devaluation itself, this reaction will increase the real cost of oil imports and accelerate Western investments in alternative sources of energy.69

Whatever policy the government of India arrives to deal with the unusually high international crude prices, it must ensure the state intervention is not increases any further. In fact, this could be used as an opportunity to further reform the petroleum sector. The government could begin with a relook at

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68 Sayed, Hassan Amid, Political and Strategic Issues in the Gulf. (Glasgow, Royston Ltd., 1984), p.149.
the duty structure for crude and petroleum products. At present, the imports duty differential between crude and petroleum products (petrol and diesel) is 10% age point-10% for crude and 20% for products. Nowhere in the world are product duties so high. The differential in crude and product duties is unwarranted considering that the value addition in refining crude into products is at the most 10%. Moreover, since the price at which refiners sell products to marketing companies or in the case of integrated companies, refining arms selling products to the marketing arms is the adjusted import parity price, it include the 20% duty levied on imported products. However, because it is a notional duty used merely to arrive at an import parity price, the same is not passed on to the government. This translates into higher gross refining margins for Indian refiners against regional refiners as against the refining margin of $6 per barrel in Singapore; oil companies in India have refinery margins of 6-8 per barrel. Reliance’s are even higher. Clearly, the huge duty differential between crude and petroleum products must be reduced. The Kelkar Committee\(^70\) has recommended a duty differential of 5% between crude and petro products. However, this kind of import duty alignment would be unfair to the oil companies if they were not allowed to increase retail prices. As of now, oil companies are able to recoup only a part of their under-recovery on the products side through the higher refining margin. It is, therefore, imperative that products prices too are freed so that oil companies are not made to bear the brunt of the price hike. In the long run this is the only feasible solution. If the government is keen on providing subsidy to any user group, then it can do so in a transparent way through the budget. This would also have the desired effect of focusing attention on the huge subsidy on various petroleum products and, hopefully, lead to their gradual elimination.

The geopolitical and geostrategic factors play an increasingly important and crucial role in the endeavors of a developing political economy with wider regional and global responsibilities, such as India’s and are therefore not to be overlooked or thought to be of little significance. Only then the aspirant, i.e. India, can realize its aims and obligations in this regard.

\(^70\) The Economic Times, New Delhi (Tuesday, June 8, 2004).