

OIL MARKETS

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Oil remains a key source of energy, and oil markets matter. Recently, there has been a revival in the debate over whether oil should attract policy attention. This paper examines what elements in oil may attract concern and policy intervention. A particular focus is the recent debate between the two schools of thought to explain recent price strength—the ‘cyclical’ school and the ‘structural’ school. There is a brief history of recent developments in oil markets and pricing. Future issues are considered which arise out of these developments and which may have policy dimensions. These include: capacity levels and supply; ‘resource curse’ and the future of supply; market control and the role of OPEC; levels of competition in the market place; and, finally, implications for the environment. The conclusion considers the challenges of using policy in such an international industry.

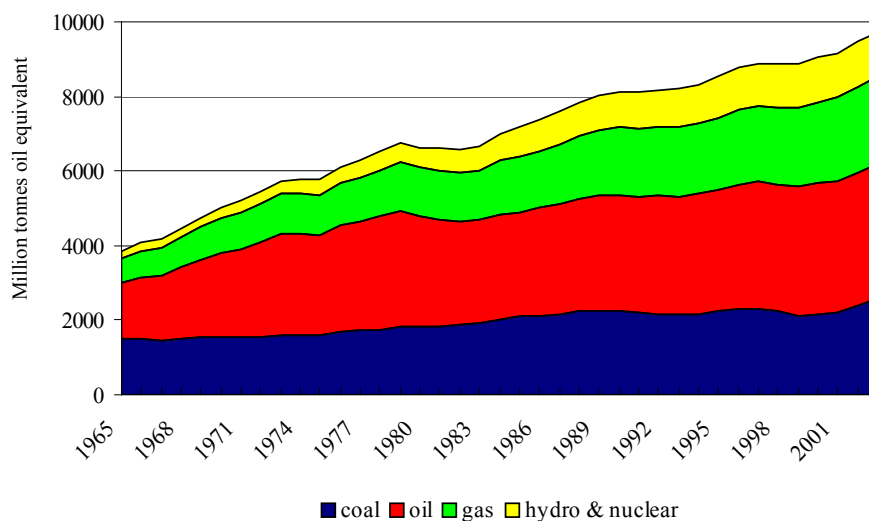
I. INTRODUCTION

Oil remains a key source of primary energy. Figure 1 illustrates its dominance. This pre-eminence arises because of oil’s physical characteristics (Frankel, 1946; Stevens, 2000). It is a liquid which flows in three-dimensional space, hence all stages in the value chain attract large technical economies of scale leading to low costs relative to other fuels. Oil has a relatively high energy content compared to other fuels—some 50 per cent more than coal on a weight basis and 170 times more than natural gas on a volume basis. Oil is also a truly international business. Crude oil and refined products constitute the largest single item in international trade, whether measured by volume or value (Hartshorn, 1993). It

is viewed as a strategic commodity, which involves it in politics and conflict on a local, national, regional, and global basis (Mitchell *et al.*, 1996; Parra, 2004). Finally, as is discussed, the oil price remains a key economic variable to determine the health of economies.

Thus, oil markets matter. This paper examines the current and future state of oil markets and some policy implications. Since the first Gulf crisis of 1990–1, there was a tendency to leave oil to ‘market forces’ and to encourage governments to deregulate and liberalize (Helm *et al.*, 1988; Robinson, 1993; Newbery, 1996, 2000; Hunt, 2003; Helm, 2004). However, in recent years, there have been growing concerns that leaving oil to the market may produce

Figure 1
World Primary Energy Consumption, 1965–2003



Source: *BP Statistical Review of World Energy 2004*.

undesirable results. Consequently, there has been a revival in the debate over the extent to which oil markets should attract policy attention. This paper examines what elements in oil markets may attract concern and hence policy intervention and what the nature and effectiveness of such intervention might be. A particular focus is the recent debate which has emerged between different explanations for the relatively high oil prices experienced in 2004. This rise in price has attracted considerable attention among analysts of the industry (Horsnell, 2004; Stevens, 2004a). In particular, the rise to over \$50 for the Organization of Petroleum Exporting Countries (OPEC) basket has puzzled many observers. There are two schools of thought to explain such strength—the ‘cyclical’ school and the ‘structural’ school. The difference is crucial since, if the cyclical school is believed then what goes up comes down, whereas the structural school would argue that higher prices than the average of \$17.68 for the OPEC basket in the 1990s will be here for some time.

Markets have characteristics which determine how they function. They have players—buyers and sellers—who have something to exchange—goods/services and money. The players have objectives which they pursue. This pursuit takes place in a context subject to legal and regulatory interventions—the rules of the game. For the oil market, the

key to its operation lies in the role of market power in a strongly oligopolistic market structure. This creates very considerable rent in the international oil price, pushing crude prices far above marginal cost. Thus, while supply and demand influence price determination, they do so in the context of a highly distorted market. This raises many policy issues for consideration.

This ‘characteristics’ approach to markets is used as the framework for this paper. Sections II and III provide a brief history of recent developments with respect to the oil market and to oil price, respectively. In particular, section II(v) concentrates on the cyclical versus structural debate, which is central to the paper. This is because if, as this author believes, there has been a structural change in oil markets, it means we are moving to a high price world for some time to come, possibly 5–10 years or longer. Obviously the policy implications for a high-oil-price world are very different from those of a low-oil-price world. Section IV then considers future issues, which arise out of the current context described in sections II and III, which may have policy dimensions. Five issues are addressed: capacity levels and supply; ‘resource curse’ and the future of supply; market control and the role of OPEC; levels of competition in the marketplace; and, finally, implications for the environment.

Section V concludes with an overview of the challenges of using policy in such an international industry.¹

II. RECENT DEVELOPMENTS IN THE INTERNATIONAL OIL MARKET

(i) The Players: Consumers

In the last 20 years, oil-importing countries have pursued three broad strands of policy: deregulation, imposition of sales taxes, and measures to address security-of-supply concerns.

There has been a strong trend of deregulation of domestic oil markets particularly relevant in the emerging market economies (EMEs)² (IEA, various years). State control over the supply chain, together with direct pricing controls, has been relaxed and private-sector involvement has been encouraged. In large part, this was in response to the general views of the ‘Washington Consensus’ regarding the undesirability of state intervention in the economy which gained ground during the 1990s.

At the same time, consumer governments have been imposing ever higher sales taxes on oil products (Seymour and Mabro, 1994). Most recently, EME governments have moved away from protecting consumers from the oil shocks of the 1970s via subsidy, to raising final prices via sales taxes (Paga and Birol, 1994; Bhattacharyya, 1995). The motive has been the attraction of raising revenue from oil products concealed behind rhetoric about protecting the environment. Oil products have a large tax base and an inelastic demand, allowing for high tax rates. Taxes on these products have the added attraction of involving low collection costs and are difficult to evade. They are a very attractive source of net revenue to any exchequer. The result of this policy trend has been a growing disconnect between international crude oil prices and demand. For example, in the European Union, of the final price of gasoline, only 12 per cent was accounted for by the price of

crude oil (OPEC, 2003). Thus a doubling of international crude prices would increase the final gasoline price by only some 12 per cent.

The final policy trend in the oil importers has been growing concern about security of supply (Fried and Trezise, 1993; Mitchell, 1994; Bohi and Toman, 1996; Mitchell *et al.*, 1996; Andrews-Speed *et al.*, 2002; Leiby *et al.*, 2002). The oil shocks of the 1970s associated with the apparent supply disruptions of the Arab Oil embargo, the Iranian Revolution, and the Iraq–Iran War forced supply security to the top of the energy policy agenda. However, the aftermath of Iraq’s invasion of Kuwait in 1990 convinced many governments that supply security was no longer an issue. The International Energy Agency (IEA) had in place its emergency sharing mechanisms, which obliged members to maintain strategic stocks. This strategic cushion, plus letting the market ‘work’, meant the worst-case scenario—i.e. a major military conflict in the Gulf—had been managed. There was minimal disruption and a short limited price spike which the global economy weathered without difficulty. However, the tragic events of 9/11, growing import dependence in the United States, plus the deteriorating situation in the Middle East have caused oil importers to think again, and security of supply has moved back up the energy policy agenda.

This has been compounded by different dimensions of events in the region. Obviously the shambles in Iraq has emphasized the limitations of the United States when it comes to managing and controlling situations. This has caused unease. As for oil markets, concerns over loss of Iraqi exports, or the loss of exports for other geo-political reasons in Venezuela or Nigeria, or, indeed, Iran in the event of an American/Israeli military strike, have played a role in the strength of prices during 2003–4. In particular, they have been potent in driving paper markets by the provision of a ‘fear premium’. However, for the oil market and, especially, the paper markets, concern over Saudi Arabia has probably dominated

¹ The academic literature on the international oil industry has always been sparse and tends to lag events. Wherever possible, references to the academic literature are made throughout this paper. However, much of the information contained comes from the trade press. To provide citations would simply swamp the paper, so many of the statements remain unsupported. However, invariably they are sourced from the excellent *Middle East Economic Survey* and the curious reader can find supporting evidence there. The website—www.mees.com—carries weekly summaries of the *Survey* and often allows free access to the ‘Op Ed’ pieces. Another valuable source of information on current oil market developments and issues is the Oxford Energy Forum.

² Defined as South and Central America, Africa, Middle East, Non-OECD Asia, and Non-OECD Europe.

such concerns. In particular, attacks on expatriate workers in the Kingdom have raised the spectre of sabotage on oil installations. For the oil market such an outcome could be devastating. For example, one single facility in the Kingdom—Abqaiq—processes 5–6m barrels per day of crude oil. If it were damaged by terrorist action, the results would be serious physical shortage in the international market. The last time there was real physical shortage in crude markets was during the second oil shock in the aftermath of the Iranian Revolution of 1979. In today's dollars the price hit over \$80 per barrel. Furthermore, that was in a market context where there were no paper markets to encourage speculation and price data were only estimated every 24 hours by Platt's daily telex service. In today's context of extensive paper markets and real time screen trading, the heights to which prices might be pushed could be unimaginable.

In reality, of course, it is precisely because of their importance and their vulnerability that oil installations in the Kingdom attract very tight and effective security. However, security can be breached and, in December 2004, a tape allegedly from Osama Bin Laden called upon Saudis to attack oil installations to deny oil supplies to the West. Also, even a failed attack would certainly encourage the paper markets to impose a significant premium on oil prices.

(ii) The Players: Producers

The international oil companies (IOCs)

The key trends which have characterized the IOCs in recent years are moves away from vertical integration, a change in financial strategies, and a bout of mergers and acquisitions.

The aftermath of the second oil shock of 1979–81 saw a significant change in structure, moving away from vertical integration to a greater use of markets. Vertical integration can take two forms (Stevens, 2003*b*). Financial vertical integration is when different stages in the value chain are owned by one holding company which controls their cash flows. Operational vertical integration is when the crude and products move between these affiliates. Operational vertical integration requires the presence of financial vertical integration, but the reverse is not true. Markets can substitute for operational vertical integration.

The IOCs, before the second oil shock of 1978–81, were financially and operationally vertically integrated (De Chazeau and Khan, 1959). Several factors explain this (Penrose, 1965; Bindemann, 1999). Transactions and information costs made operational vertical integration superior to markets which were non-existent or highly inefficient. Operational vertical integration also inhibited competition since it provided significant barriers to entry. If the companies only exchange crude between their affiliates, there is no access to crude for third parties. It is possible to practise price discrimination by integrating into the low-priced market, preventing arbitrage. Finally, operational vertical integration enabled the companies to play tax games through the use of transfer prices to minimize their global tax bill.

After the second oil shock, the IOCs moved away from operational vertical integration, preferring to use markets. The nationalizations of the 1970s, plus the discrediting of long-term contracts, increased the number of arm's length transactions, which meant a greater number of buyers and sellers plus greater market transparency (Hartshorn, 1980). The consequent lowering of transactions costs encouraged further use of markets which created a self-feeding process of more players, more transactions, and more transparency. Barriers to entry weakened as new non-integrated crude producers entered the market, and as the majors began to sell off refineries to smaller 'petropreneurs' (Bleakley *et al.*, 1997). In such a world, constraints of competition became less relevant. Finally, the tax authorities began to limit transfer-pricing games. Hence, operational vertical integration among the IOCs, except in certain specific cases, disappeared. Most recently, the issue under discussion is the value of financial integration for IOCs given the continued poor profitability of the refinery sector (Horsnell, 1997; Stevens, 1999).

A relevant trend has been a shift in financial strategy (Stevens, 2004*a*). During the 1990s, following the general trend in corporations in the United States and the United Kingdom, the IOCs began to adopt value-based management systems. Thus, based upon capital asset pricing model methodology, if the company cannot earn a rate of return on its capital at least as great as the equities in the sector and the market more generally, then it should return funds to

the shareholders via dividends or share buy-backs, rather than investing itself. A consequence which deserves further discussion in section IV is that, during the high prices experienced since 2000, increased sums of capital have been draining out of the industry's investment pot. This contrasts with the aftermath of the second oil shock of 1978–81. High prices led to sharp increases in investment in the upstream creating a large expansion of capacity which, by the mid-1980s, undermined the high oil prices resulting in the 1986 oil-price collapse.

Finally, the IOCs since 1998 have experienced mergers and acquisitions which have significantly increased the concentration ratios in the upstream and downstream of the industry (Luciani and Salustri, 1998). This was triggered by the oil-price collapse of 1998, which made the purchase of others' reserves an attractive proposition. Several factors explain the dash to 'merge' (Stevens, 1999). Certainly it was perceived that there would be synergies to reduce costs. It also gave an opportunity to reshuffle the new asset portfolio with a view to selling the lesser performing assets, mainly in the downstream. In addition, the well-known 'herd instinct', which has dominated the industry since 1945, may have played a role (Ollinger, 1994; Lynch, 1995). Once the first mega-merger had taken place between BP and Amoco, shareholders' expectations created a feeding frenzy forcing the others to follow. Whatever the reason, the industry became more concentrated. To be sure, various regulatory bodies in the United States and Europe forced the larger companies to divest certain key assets to protect competition, but the sense remains that the industry did become less competitive as a result. In particular, and this is relevant for later discussion, the now much larger IOCs, as buyers of services, became extremely powerful, forcing down profits for the service companies, leading to lower investment in service-industry capacity, and threatening the industry's ability to develop more upstream capacity.

The national oil companies (NOCs)

The paths followed by the NOCs of the major producing countries were rather different from the IOCs.³ From the 1980s, many NOCs developed a

financial, vertically integrated capability, largely through buying the divested downstream assets of the IOCs. However, they opted to use operational vertical integration rather than markets (Stevens, 1998, 2003b). The official reason was to lock in market share to protect themselves from the new supply emerging from Non-OPEC. However, an alternative explanation was to deepen the information asymmetries at the heart of the principal–agent relationship, thereby enabling greater rent capture by the NOC management. This prompted producer governments to scrutinize the behaviour of their national oil companies (Van der Linde, 2000; Stevens, 2004b). The result has been, in many cases, severe restrictions of funds available to NOCs and a desire by the controlling ministries—usually finance—to force greater transparency and accountability from the NOCs. One of the options to achieve this has been by opening the domestic upstream sector to IOC investment in an attempt to create benchmarking options reducing the information asymmetries.

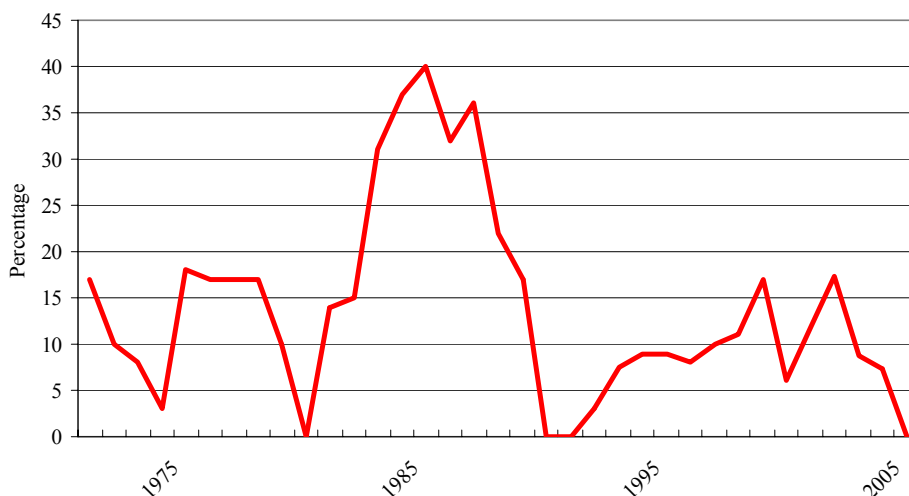
An important dimension of these growing restrictions relates to the relative importance of the NOCs versus the IOCs. The NOCs are increasing their role in crude supply relative to the IOCs largely as a result of their exclusive and preferential access to acreage (Luciani and Salustri, 1998). This is compounded as the NOCs of the importing countries of Asia are encouraged to move abroad in search of equity oil. If this growing dominance of crude supply is linked into the continued use of operational vertical integration, this could lead to a reduction of transactions in crude oil markets, reducing the efficiency of those markets and increasing the transactions costs associated with their use. In such a world, it is feasible that the IOCs could begin to revert to operational vertical integration, moving away from the development of efficient markets which have characterized the 20 years.

OPEC

OPEC's ability to manage the market has long been a subject of intense interest (Adelman, 1980; Seymour, 1980; Gately, 1984; Griffin, 1985; Mabro, 1992; Parra, 2004). The role of OPEC and its problems are clear and well understood. The inter-

³ The use of the term IOCs can be misleading since an increasing number of NOCs are, indeed, operating internationally. However, the distinction is determined basically by ownership.

Figure 2
OPEC—Spare Capacity to Produce Crude Oil



Source: 1971–91, CIA; 1992–2005, author’s estimates.

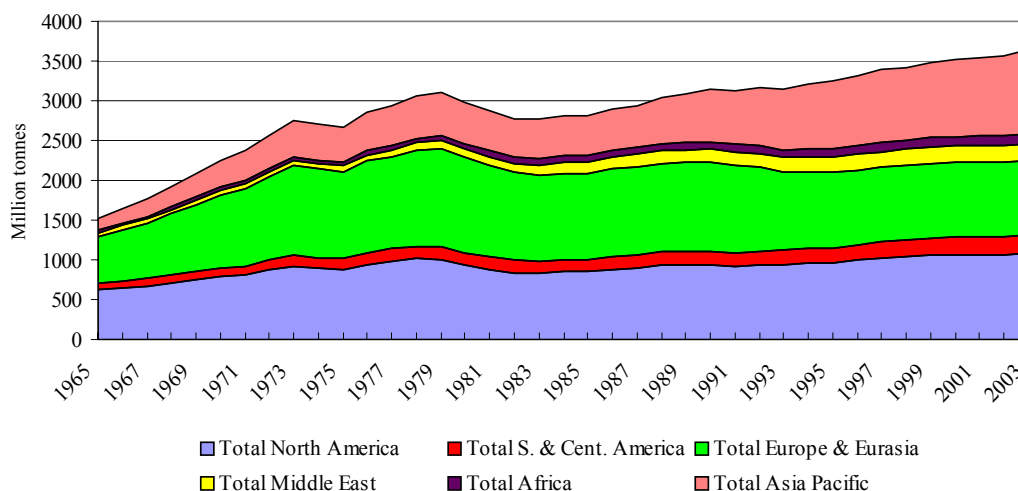
national oil industry has generally faced excess capacity to produce crude oil. Figure 2 illustrates the pattern since 1970. Several factors explain this (Stevens, 2000). The price of oil has always exceeded the cost of replacing the produced barrel. This rent, arising either from low production costs as a result of favourable geology or from market manipulation, created the incentive for the owner of the discovered oil-in-place (normally the government) to develop the capacity to produce it. Existing producing facilities have been subject to sudden outages from accidents or political events. This required the rapid development of replacement capacity. However, once the original loss is restored, this capacity becomes surplus to requirement. As indicated earlier, the industry has always been driven by a strong sense of consensus. Everyone, following the same signals, tends to make the same investment decisions, generating a classic case of the fallacy of composition. For example, at the end of the 1970s and early 1980s, all the IOCs believed the price of oil would rise inexorably forever. The result was massive investment in developing capacity outside of OPEC, from which they had recently been excluded by successive nationalizations. The final explanation for the presence of excess capacity was a deliberate decision by Saudi Arabia. When it decided in 1985 to maintain lower stable prices to encourage a reversion to oil by energy consumers, it was decided that stability required the maintenance of spare capacity in the Kingdom to manage potential oil shocks.

Given this excess capacity, the function of the market controller—the IOCs in the 1950s and 1960s and OPEC since 1982—has been to prevent the excess coming to market creating downward pressures on prices. Thus OPEC must estimate the call for its crude and then allocate that call among the members to ensure the market is managed. This faces two challenges—poor quality of market information and the classic cartel problem of cheating (Stevens, 2002).

In the 1950s and 1960s when the IOCs were in control, their operational vertical integration and dominance of international supply gave them excellent information on supply and demand. This enabled them to orchestrate supply and (to an extent) protect prices from downward pressures. The breakdown of this horizontal and vertical integration of the industry by the nationalizations of the 1970s and the other processes described above meant that the information was simply lost. When OPEC comes to assess world oil demand, Non-OPEC supply, and the consequent call on OPEC, the data are poor and unreliable. The best OPEC can do is guess and hope. Thus, for example, the price collapse of 1998 was triggered by an OPEC decision taken at the November 1997 meeting in Jakarta, which grossly overestimated demand and underestimated supply outside OPEC-10.

The second problem facing OPEC is the inevitable cartel problem of detecting and deterring cheating.

Figure 3
Oil Consumption by Region, 1965–2003



Source: *BP Statistical Review of World Energy 2004*.

Thus much of the analysis of oil markets has focused upon these challenges and OPEC's ability (or lack of ability) to manage (Stevens, 2002). In particular, there has been much debate about the relative importance of OPEC versus Saudi Arabia in the literature (Cremer and Isfahani-Salehi, 1991; Dahl and Yucel, 1991; Al-Turki, 1994; Gately, 1995; Salehi-Isfahani, 1995; Gulen, 1996; AlYousef, 1998). In the best traditions of empirical testing in economics, the results are ambivalent and contradictory. However, on balance, few would dispute the pre-eminent role of Saudi Arabia in controlling oil markets by virtue of its possession of significant quantities of spare capacity which it has been willing to use to manage the market.

Over the last couple of years (described in more detail below in section III(ii)) OPEC control has been less of an issue. Strong demand, a poor performance by Non-OPEC outside of Russia, and the loss of capacity as a result of geo-politics have meant that OPEC, with the exception of Saudi Arabia, has been able to produce to capacity in a market of rising prices. Thus, the quota system has been less controversial and questions about OPEC's ability to control the oil market appeared to be slipping off the agenda. However, a fundamental issue remains since some members, producing over their quotas, want a formal increase. This desire for a higher formal quota is reinforced because the opening to IOCs in the upstream (described below

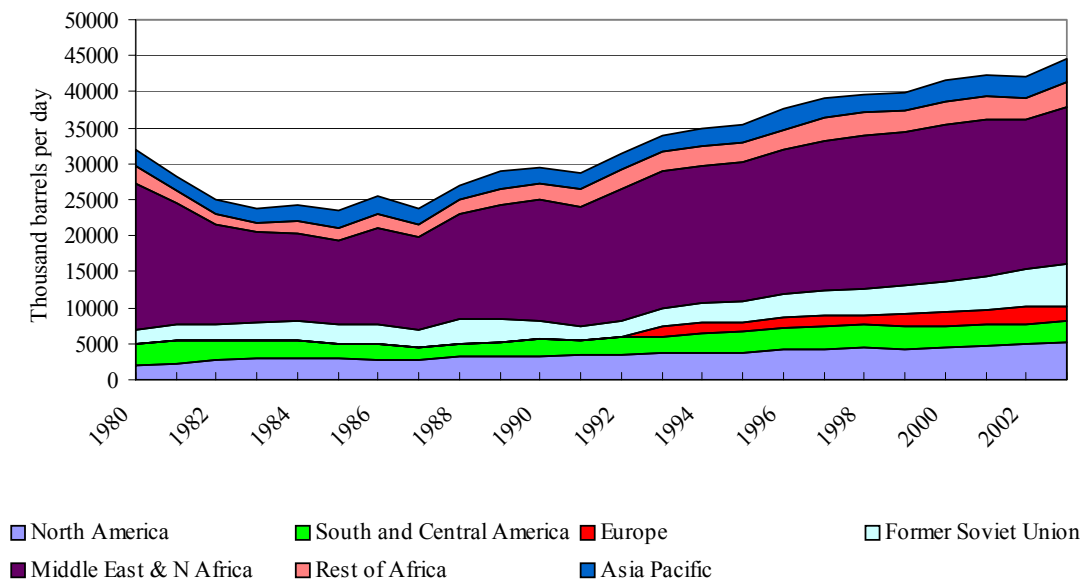
in section II(iv)) means their capacity is expected to grow in the foreseeable future. At the same time there are members (notably Indonesia and Venezuela) who cannot produce to quota but who are unwilling to acknowledge this by giving up their share of quota. Should demand weaken, Non-OPEC regain its former strength, or geopolitics cease threatening supplies, this will raise concerns again about OPEC's role.

(iii) The Exchange

In terms of the exchange in the oil market, several clear trends have emerged. Oil consumption is inexorably moving towards the EMEs, especially in Asia. Figure 3 illustrates this. Forecasts suggest this trend will continue and if they are to be believed, will become ever more pronounced (IEA, 2002). In addition, much of the growth is in the transport sector (Paga and Birol, 1994; Dargay and Gately, 1995). Heavy fuel oil continues to lose ground in the static sector, which requires ever growing investment to convert the heavier ends of the barrel into light ends, where the demand growth will come. This 'destruction' of fuel oil has become one of the most pressing issues for the refinery sector.

Supply of traded crude has been increasingly concentrated in the Middle East, as can be seen from Figure 4. This causes growing unease among consumers, who rightly or wrongly perceive the region

Figure 4
World Oil Exports by Region, 1980–2003



Source: BP Statistical Review of World Energy 2004.

to be politically unstable and unreliable, although such views are regarded as unjust and unreasonable within the region itself. In particular, Saudi Arabia rightly sees itself as a source of great stability and reliability in the oil market. The final trend is that reserves close to markets are dwindling, and the additions to reserves are further away. The oil must travel ever greater distances to reach markets, which raises issues of the adequacy of the transportation infrastructure and the security of sea lanes and transit pipelines (ESMAP, 2003).

(iv) The Rules of the Game

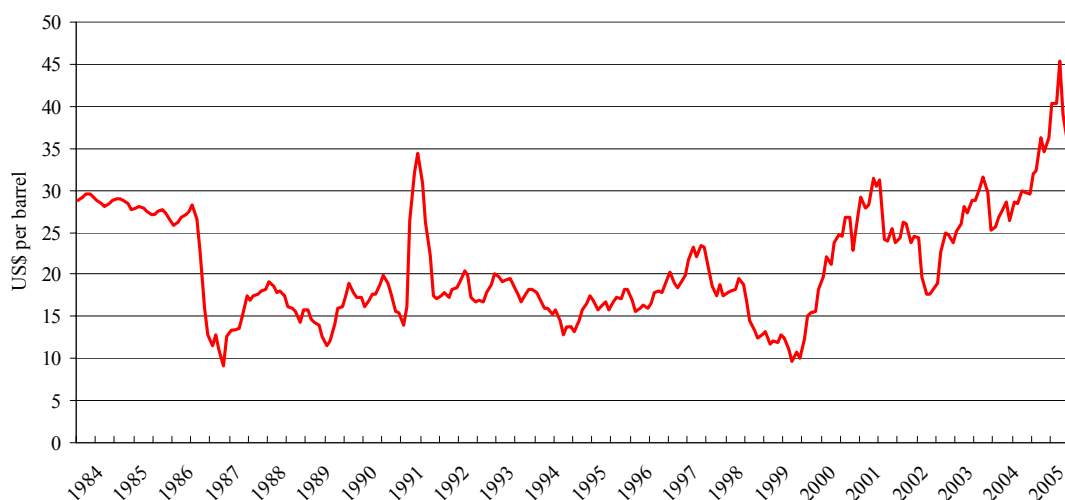
The trends of recent years have been for the legal and regulatory environment to encourage greater private-sector involvement in the industry and to deregulate the sector (IEA, various years). This has been especially prevalent in the EMEs, where there has always been a history of heavy state involvement (Van den Linde, 2000).

In the downstream and midstream in the OECD, the emphasis has been on maintaining competition. For example, during the mega-mergers described in section II(i), the competition authorities, notably in the United States and European Union, examined the implications and, in most cases, forced some degree of divestiture to maintain competition. Simi-

larly, many legislative authorities have also been working to try and widen access to pipelines and other infrastructure (Stevens, 1996). In the EMEs, the emphasis has been on moving what was a largely state-controlled sector into the private sector. This has involved a combination of privatization and deregulation (Mackerron and Pearson, 1996, 2000).

In the upstream, the main change has been opening acreage for exploration and development for IOC and NOC investment. This has been driven by a desire to access capital and technology and to provide benchmarks to measure the performance of NOCs. This process has been especially noticeable among the OPEC members. Some, such as Algeria and Nigeria, have been very successful. Others, such as the ‘apertura policy’ in Venezuela, the ‘buy-backs’ in Iran, and ‘Project Kuwait’ in Kuwait, have all proved problematical as a result of the process falling foul of domestic political disputes. Currently, only two countries—Saudi Arabia and Mexico—have ruled out such investment and, even here, Mexico is trying to remove the constitutional restrictions to upstream investment. This opening has also been encouraged by technical change which has allowed operations in ever greater depths of the oceans. The outcome of this general opening has been a major increase in capacity over the last 10

Figure 5
Monthly Oil Prices—OPEC Basket, 1983–2005



Source: *Middle East Economic Survey*—various issues.

years. One consequence of this, already described in section II(ii), is that some in OPEC are seeking higher quotas.

An area of particular interest in this ‘opening’ process has been the Former Soviet Union (FSU). Immediately following the break-up, there was a strong rush of IOC investment in the upstream. In the Caspian region this proved to be relatively enduring (ECSSR, 2000). In Russia, however, the early enthusiasm quickly dampened as the institutional framework proved ineffective (Considine and Kerr, 2002). More recently, Russia has come back on to the agenda for upstream investment, starting with the massive involvement of BP in the TKN joint venture. However, there remain concerns. The legal and regulatory environment remains very uncertain and unpredictable. There are also clearly signs of political tensions in relations between the Putin administration and the oil oligarchs. Finally, there is concern that continuing production growth could lead to a severe attack of Dutch Disease, whereby the inflow of revenues causes a significant appreciation of the real exchange rate. After the collapse in the value of the rouble in the summer of 1998, there has been a strong revival in the non-hydrocarbon sector. Any appreciation of the real exchange rate could halt that in its tracks. While many forecasts are projecting continuing growth in Russia crude production, for the reasons outlined above, there must be some doubts about the validity of such forecasts.

One significant development in the rules of the game at an international level has been the Energy Charter Treaty (Waelde, 1996). This Treaty emerged from negotiations started in 1991. The initiative from Jan Lubbers, as President of the European Union, was to provide a legal framework to govern investment from Western Europe into the energy sector of the FSU. Subsequently, the scope and coverage widened considerably. A particular purpose of the Treaty, which became binding in April 1998 with the 13th ratification, is to manage disputes in a way which minimizes disruption to operations. Thus member states, by signing and ratifying the Treaty, give their consent to the submission of disputes to international arbitration in the event that an investor in an energy project chooses this course. In particular, the problems associated with transit pipelines received considerable attention. However, a problem with the Treaty is that it was negotiated in a hurry and many crucial issues were finessed, leaving interpretation to the courts. Also, the Russian Federation, which is clearly a key player, has yet to ratify. It remains to be seen just how effective the Treaty may prove in terms of encouraging investment in energy and influencing government policy in the member countries.

(v) A Recent Debate

As already alluded to, the recent rise in crude prices seen in Figure 5 has attracted considerable attention. The two schools of thought which explain such

strength—the cyclical and the structural schools—have each been vocal in support of their view of events, although most participants in the debate see both schools as having validity. An important dimension concerns how the difference between a cycle and a structural change is defined. Oil prices are determined by drivers which have an impact on demand and supply and the behaviour of those who make the price. Changes to these drivers can be viewed as cyclical. A structural change is when the ‘coefficients’, which determine the impact of these drivers on price, change. These ‘coefficients’ can be quantitative, such as various price and income elasticities. They can also be qualitative, such as the price objectives of OPEC and expectations in the paper markets. One of the problems with the debate is that, given this definition, a structural change is not apparent until the cycle changes and so the outcome of the debate must await events.

The cyclical school argues that all drivers of oil prices since December 2002 have been pushing in the same direction. Thus, in the wet barrel market, demand has been exceptionally strong and, for 2004, is the highest global growth in oil demand since 1978. At the same time, outside of Russia, Non-OPEC supply has disappointed, as projects have been delayed. Finally, geopolitics has removed physical supply, starting with the Venezuelan oil workers’ strike in December 2002, followed by the Iraq war, problems in Nigeria, and various other interruptions. Thus the physical market for oil has been tight, with the result that surplus capacity to produce crude oil has diminished from around 7m barrels per day (mbd) at the start of 2002 to less than 1 mbd by October 2004.

At the same time, the paper markets were also pushing prices higher. There was a widespread perception that the historically low levels of inventories signalled real physical shortage, although this was almost certainly not the case. The companies were moving towards ‘just-in-time’ inventory management to try and reduce working capital. Also backwardation in the future’s curve meant that those wishing to secure future supplies were better buying paper barrels rather than paying high current prices and then having to pay for storage. Geopolitics also frightened the non-commercials operating in the paper market—in particular, terrorist activities in Saudi Arabia which appeared to create a

serious threat to oil supplies on a grand scale. Finally, the money managers, faced with disappointing results in equity markets, moved considerable funds into commodities, with the result that all commodity prices were increasing during 2004.

Members of the structural school saw the rise in prices in a different light. They argued that years of inadequate investment had caused the excess capacity prevalent at all stages in the oil-industry value chain to erode and be replaced by current and impending shortages. This new view was reflected in changes to the forward curve for oil prices 6–7 years out. During the 1990s and up to 2002, while the front end of the curve had jumped around from between \$10 and \$35 per barrel, the back-end remained stubbornly between \$18 and \$22 per barrel. However, since later 2002, the back-end price has been steadily rising and reached in excess of \$35 per barrel. This is seen as reflecting expectations of impending shortages. While this may, indeed, reflect concerns about shortage, it can also partially be explained by spread trading practices, whereby speculators are buying crude 6–7 years out as part of a trading play in a very illiquid market which would tend to push up the back-end prices.

This ‘structuralist’ view, it should be said, is different from that espoused by the depletionists or those followers of Harold Hotelling. The depletionists argued that the world would become reserve constrained and, using Hubbard Curve analysis, predicted an imminent downturn in oil supplies (Campbell, 1997; Campbell and Laherre, 1998). The fact they had been predicting this ‘imminent’ demise for over 20 years did not give them much credence. Furthermore their arguments were seriously flawed methodologically (Barnett and Morse, 1963; Adelman, 1990; Gordon, 1994; McCabe, 1998; Stevens, 2004a). Three reasons explain. First, they assume a fixed stock of ‘conventional’ oil reserves. This ignores the role of investment and, while (as will be discussed below) this is a key issue, it has no part in the depletionists’ battery of arguments. An even more egregious error is that it ignores the potential from ‘unconventional’ oil reserves. Second, they assume future oil demand will grow without limitation. Again, there are a great many arguments which can be deployed as to why various drivers will eventually slow such growth. These range from environmental and security-of-supply concerns to

consumer governments in EMEs using sales taxes on oil products to raise revenue, to name but a few. Finally, they ignore the feedback loops provided by markets. Growing shortage would increase costs and prices, which would in turn reduce the quantity demanded and increase the quantity supplied.

As for the views of Hotelling (Hotelling, 1931), he argued that, because the stock of oil was ‘fixed’, producers maximizing wealth would produce this fixed stock in such a way that prices would rise in line with their discount rate. However, the notion of a ‘fixed stock’ of oil is simply not true except in some pedantically mindless geological sense. Also the evidence fails to support the Hotelling hypothesis (Bradley and Watkins, 1994; Adelman and Watkins, 1995). Hotelling’s contribution to the understanding of oil markets is controversial and much debated—most convincingly and eloquently by Adelman (1990) and Gordon (1994). One obvious contribution is the observation that scarcity would be signalled by rising costs and, hence, eventually rising prices. Some argue that more sophisticated models, such as Dasgupta and Heal (1979), derived from Hotelling’s original model offer insights into the nature of substitution.

As explained below in section III(ii), the structuralist school argues for shortage and higher prices arising from lack of investment rather than the reserve constraint argued by depletionists, or producer behaviour argued by Hotelling. Which school of explanation is correct, of course, will be crucial to the future prospects of oil prices, and this is discussed below.

III. RECENT DEVELOPMENTS IN OIL PRICES

(i) Volatility

Oil prices have increasingly become volatile. This is supported by casual observation of Figure 5, but is also supported by empirical studies (Plourde and Watkins, 1994). The origins go back to 1986. To avoid a return to government official sales prices and the netback pricing method which prompted the oil price collapse of 1986, OPEC adopted the use of a basket of spot oil prices to determine contract prices. While they continued to try and balance the

market to match supply and demand, the actual market price was left to the vagaries of the physical spot market and, increasingly, the newly developing paper markets (Hartshorn, 1993; Roeber, 1993; Parra, 2004).

This approach suffered two basic flaws (Stevens, 2002; Lynch, 2003). The first was the poor quality of information already discussed. The second was that many of the non-commercial players have a poor understanding of the international oil market. Therefore, their reaction to information as it trickles into the marketplace is fickle, unpredictable, and often perverse. Furthermore, their decisions to trade paper barrels are often influenced by what is happening to other elements in their financial portfolios which have nothing to do with oil markets. They also have a strong herd instinct which encourages bubbles and significantly aggravates volatility, despite the assertions of some economic theory (Lux, 1995).

Thus the majority of the traded crude oil is priced off a handful of spot crude prices—some 60 per cent is priced off Brent (Horsnell, 1997). Furthermore, the physical availability of these crudes is diminishing. Resulting poor liquidity plus unpredictable behaviour by traders inevitably leads to much greater price volatility. As is discussed below, this greater volatility is causing problems both for producers and consumers, leading to demands for policy intervention.

(ii) Trends

Two recent oil price trends which carry policy implications are developed in this section: the Asian Premium and the rise in oil prices since 1999.

The Asian Premium is the observed difference between the price of crude oil sold into Asia compared to the other two main consuming areas—the United States and Europe. Since 1997, the formula prices of Arabian Light into Asia have averaged a premium of \$1–1.50 per barrel, while formulae prices to Europe and the USA have remained roughly similar (Ogawa, 2002).

The Premium owes its origin to the aftermath of the 1986 price collapse. The Saudi formula prices (at least notionally) were determined in the marketplace and were based on various spot prices. Three pricing areas were introduced: deliveries to the

USA based upon West Texas Intermediate (WTI); deliveries to Europe based upon Brent; and deliveries to Asia based upon an average of Dubai and Omani crude. However, for each formula price ‘adjustment factors’ were applied, involving ‘a little monthly ad hoc finagling, the details of which are not published and not generally known’ (Frank Parra, 2002, *Middle East Economic Survey*, 45(38), p. D3). The significance of this price-setting process is that other OPEC prices tend to ‘pretty much follow’ (ibid.) these Saudi formulae prices.

The Asian Premium is understood by reference to ‘discriminating monopoly’ and ‘limit pricing’. As part of the introduction of formula pricing, Saudi Aramco imposed destination clauses on crude sales and refused to allow spot sales. This was the key mechanism to keep markets physically separate. Without destination clauses, the Asian ‘limit price’ would be the European price plus any additional transport costs. Most of the other Middle East crude suppliers have limited ability to sell more crude into Asia. They are limited by the amount of crude they can shift from Europe to Asia in response to price differentials. By contrast, Saudi Arabia with its very large excess capacity can easily meet additional demand from Asia, albeit within the context of OPEC quotas. Thus, again, this inability to switch between markets strengthens the ability of Saudi Arabia to keep the markets physically separate.

However, the real key is the difference in demand elasticities between the Asian and the US and European markets. The USA and Europe face a variety of crude suppliers willing and able to supply crude oil, compared to Asia. Asia is obsessed by the issue of supply security and will pay a premium for what it sees as secure supplies of crude oil. Specifically, the bulk of the crude purchased is done so on the basis of term contracts rather than spot contracts. Asian buyers are unwilling to risk the vagaries of the spot market and fear that they will be unable to secure refinery input. In effect, the Asian premium exists because Asia is willing to pay it.

Also, there is much more scope for ‘limit pricing’ in Asia than in the USA or Europe. Whenever Saudi Arabia sets its formula price for Asia, it is risking that it can set it at a level which will not drive away buyers or attract competition from other sources. Asia demands term contracts. Because alternative

suppliers are very few, the ‘limit price’ is higher than in the USA or Europe, where attempts at overpricing will produce a rapid and effective competitive response from buyers and other suppliers. The difference is the Asian Premium.

The policy dimension relates to what the Asian consumers (who object strongly to the existence of the Premium) might do and how Saudi Arabia might react. These are discussed in section IV(iv).

A key issue of concern over price trends is whether the recent strength in prices is here for some time. The answer depends upon which of the two explanatory schools outlined in section II(v)—the cyclical or the structural school—proves correct. Both have strengths and weaknesses. There have been cyclical dimensions to the price strength. In particular, there has been strong crude stockpiling in Asia, following the growing crisis in the Middle East and exceptional demand growth in China. However, both look unsustainable—as, indeed, does the bull-run in the paper market. Fears of growing shortage as a result of a lack of investment do have some justification, as developed below in section IV(i). In addition, it seems likely that Saudi Arabia’s oil pricing policy underwent a significant change during 2003. Since 1985, Saudi Arabia has pursued a policy of stable relatively low prices to encourage energy users to return to oil, thereby reversing moves away from oil following the oil shocks of the 1970s. However, it now looks likely that, while wishing to maintain stable prices, Saudi Arabia wants higher prices—above the \$30-per-barrel mark. Several factors explain. The recent devaluation of the dollar has meant that prices in the fourth quarter of 2004 were equivalent in terms of euros to the price at the start of 2002. Thus part of the ‘higher’ price of oil is misleading, depending upon who is trading. The growing problem of unemployment in the Kingdom is creating a major political crisis for the government, which can only be solved by creating yet more public-sector jobs, which requires ever more revenue. In addition, the objectives of the low-price strategy have continually been undermined by the policy of raising sales taxes on oil products described above in section II(i). Finally, no less a personage than Alan Greenspan has indicated that the global economy can comfortably live with \$30 oil, although this is a view which could be controversial, as discussed in section III(iii) below.

Taken together, impending shortage and the new Saudi policy imply that prices significantly higher than those experienced in the 1990s are here to stay for some considerable time. However, as previously discussed, we will not be sure of this until the cycle changes and we can observe if the 'coefficients' have changed. As developed below, a high-oil-price world could well prompt calls for a policy reaction.

(iii) Impact of High Prices on the Global Economy

Ever since the first oil shock of 1973–4 appeared to trigger a global recession, the impact of oil prices on global economic activity has been a subject of considerable interest (Fried and Schultze, 1975; Hamilton, 1983; Healand and Chichilnisky, 1991; Mork, 1994). The general conclusion of these and other studies is that high oil prices do inhibit global economic growth. Indeed, Hamilton (1983) has claimed that all but one recession in the United States since 1945 has been preceded by a period of higher oil prices.

The recent higher oil prices experienced since 2000 have revived interest in the subject, especially when prices went above \$50 in 2004. The balance of recent evidence continues to support a connection (Balabanoff, 1995; Lee and Ratti, 1995; Huntington, 1998; Jones *et al.*, 2004). However, during 2004 there were many claims, reported in the trade press, from those who argued that the world had changed and could now live with higher oil prices. In particular, this is due to the facts that, compared to the 1970s and 1980s, oil is much less important in the balance of payments in most countries, and oil intensities are less. For example, the Asia Development Bank claimed that an increase in price from \$30 to \$40 reduces Asian GDP by 0.1 per cent, trade balance by 0.3 per cent of GDP, and consumer price inflation increases by 0.5 per cent. These are relatively small numbers. Also some have queried the direction of the relationship, pointing out that higher oil prices are triggered by strong economic growth, and thus the causal relationship between higher prices and recession is spurious (Barsky and Killian, 2004). However, there are still grounds for concern. A growing number of observers are beginning to argue that GDP growth in 2005 will be slowed by the higher oil prices. As a result, they are now down-

grading their oil demand forecasts for 2005. Also, the macroeconomic models, upon which many of the forecasts projecting little or no impact are based, are notoriously bad at managing sudden changes in expectations of the sort that much higher oil prices can create. Thus, it is too early to determine the precise effect of the exceptionally high oil prices experienced in the third quarter of 2004.

IV. KEY FUTURE ISSUES FOR OIL MARKETS WHICH CARRY ENERGY-POLICY IMPLICATIONS

(i) Capacity Levels and Supply

A matter of concern is future capacity availability at all stages in the oil industry value chain. In terms of the upstream, while the depletionists' arguments based upon reserve constraints can be dismissed, there is a danger that predictions of crude shortage may prove true. It is generally agreed that a great deal of money needs to be invested in exploration, development, and production to sustain an increase in crude oil supplies. The IEA estimated that some \$2,188 billion would need to be invested in exploration and development between now and 2030 if expected oil demand was to be supplied (IEA, 2003)—an annual average of \$81 billion. Leaving aside issues of exaggeration in the forecast, there must be serious doubts that enough will be forthcoming from the IOCs. This is not for lack of funds. The high prices enjoyed over the last 2 years have given the IOCs record years in financial terms. In the past, such high oil prices would have encouraged ever greater investments in exploration and production, thereby creating a self-adjusting mechanism by increasing supply (Berman and Tuck, 1994).

However, in recent years this has failed to materialize. As explained above, the IOCs, in their struggle to maintain shareholder value, are returning money to the shareholders. In 2004 BP is expected to have returned over \$6 billion. To put this in perspective, in 2003, BP invested \$9.7 billion in exploration and production activities. In similar vein, ExxonMobil is also expected to return some \$6.4 billion to its shareholders. The danger is that the short-term benefits to share price will be at the expense of future investment in maintaining and developing crude capacity.

There are several reasons why returns are sufficiently poor to justify returning funds to the shareholders. Existing fiscal regimes have become so progressive in recent years that, at prices much above \$30 per barrel, the bulk of the windfall accrues to host governments rather than the IOCs. Also, access to low-cost reserves, which could improve returns, is limited. Some 53 per cent of world proven oil reserves lie in four countries. Of these, Kuwait and Iran are trying to encourage IOC investment but the process has stalled because it has fallen foul of domestic politics. Saudi Arabia refuses to allow investment from abroad in upstream oil, and Iraq is such a disaster area that no serious investment is likely for a long time to come. The other major opening has been in Russia, but, as explained earlier, there are also problems as this develops.

A consequence of the mega-mergers of the late 1990s is that the IOCs have been shedding labour to cut costs. Thus they have now become managerially constrained and lack enough staff to manage new projects effectively. Also, the service industry has been squeezed, as the large IOCs have increased their monopsony power and as the growing use of e-commerce has also cut service-industry margins. Thus the service industry, which is losing money, has not been investing in capacity and capacity is tight. This means that, even if the IOCs decided to try and spend the money on new investment, there is insufficient capability in the service industry to accommodate more projects.

As to other sources of investment funds, as described above, many of the NOCs in the major producers are currently capital constrained. Governments are increasingly suspicious of their rent-seeking behaviour and, in any case, have locked themselves into a high-spending world. Thus the revenue is required for other things and investing in new capacity which may bring down price makes less sense. Thus NOCs in the producer countries may not fill any gap arising from IOCs' unwillingness to invest.

Simple economics argues that high prices produce a supply response creating a self-correcting mechanism. However, this tends to neglect the lead times. In upstream oil, the lead times for new capacity from negotiations on acreage to first oil can be between 5 and 8 years. Thus, any crude shortages resulting

from the current outflow of potential investment funds could be around for some time, together with their resultant high oil prices. Furthermore, this lack of investment will have an impact on all stages of the industry including refining, transportation, marketing, and distribution. There is a serious danger that short-termism, driven by the demands of the stock market, may prove to be seriously damaging to oil supplies and prices.

The obvious question is: if there is a case of market failure, can policy help to alleviate these potential shortages? This is reinforced if there are security-of-supply concerns and concerns about the macroeconomic impact of higher oil prices.

Several policy solutions are, in theory, available. Home governments of the IOCs cannot order them to invest more, but they can try and persuade. This could be done by offering industry-specific tax breaks on investment. Alternatively, they could penalize returns to shareholders, although this is an extremely unlikely option, since it effectively undermines the basis of a market economy. However, in a global world economy, there is always the temptation for government to free ride and leave difficult solutions to others. Such policy solutions could only be effective if there were some form of collective decision by the home governments, possibly under the auspices of the G8.

Individual home governments could also ensure that there is no collusion between the IOCs to restrain capacity. The minerals industry in the 1980s went through a similar process to oil. Mineral prices were poor and company profitability weak. The industry stopped investing, capacity became tight, prices and profitability rose. However, preferring this world to the previous world, the mineral companies allegedly limited investment to keep supplies tight. There is a suspicion that this was achieved through a degree of collusion and a number of anti-trust cases are pending.

An alternative option would be to bring political pressure to bear to try and improve access to upstream acreage. An obvious example would be for the USA to remove sanctions against Iran as it has done for Libya. Restoring Libya to international respectability is leading to a feeding frenzy by oil companies to invest in that country's upstream.

Saudi Arabia might also be amenable to pressure. There has been a long history of the Kingdom sacrificing its stance on oil policy in return for perceived foreign policy benefits. International efforts to stabilize the desperate situation in Iraq might also assist. However, such a policy option smacks of a revival of the old imperialist days which many would regard as undesirable.

Consumer governments, who may also be home governments, have several policy options. If they are also producers, they could relax fiscal terms to encourage more investment in their upstream. They could also follow the example of some of the larger Asian oil importers and encourage upstream investment by their own companies abroad. This is clearly a pattern which they followed during the period of higher minerals prices described earlier, and there are signs that India and China are following suit in oil. How effective this might be is debatable, and the record of Japan following such a policy is not encouraging (Koyama, 2001). One possible negative consequence of such moves, to be discussed below in section IV(ii), is the danger that the investors pay little or no attention to the consequences for the host country. These range from promoting ‘resource curse’ to embedding extremely unpleasant regimes.

(ii) Resource Curse and Future Supply

There is a further threat to future crude oil supplies—resource curse—which carries important policy implications. Common sense and economic theory argue that large windfall profits from oil projects should enrich a country and its population. While money cannot buy happiness it is a good down payment. Large inflows of foreign-exchange revenue should overcome capital shortage and lack of investment. However, there is strong evidence that the reverse is true and that large oil revenues damage the economic base of a country and tend to aggravate poverty rather than alleviate it. This phenomenon has been labelled ‘resource curse’. It has a long history but recently has moved up the agenda (Stevens, 2003*a*). This has been partially as the result of the World Bank’s ‘Extractive Industry Review’ forced by a number of non-governmental organizations (NGOs) to consider the Bank’s role in funding oil, gas, and mineral projects in developing countries. It is also partially a consequence of

growing concern about corporate social responsibility. There is a real danger that concern about ‘resource curse’ could inhibit future investment in upstream capacity by responsible IOCs, aggravating the potential capacity constraint discussed in section IV(i).

There are multiple policy issues which follow. All are geared to answering the question as to how a ‘curse’ can be avoided and how a ‘blessing’ can ensue, since there is growing evidence that ‘resource curse’ is not inevitable (Stevens, 2003*c*). The answer lies in the distinction between ‘developmental’ and ‘predatory’ states (Mkandawire, 2001).

A developmental state has two components—ideological and structural. The ideological component is when the ruling élite adopts ‘developmentalism’ as the prime objective and legitimacy is derived from the ability to deliver development. i.e. growth and poverty reduction. The élite then establishes an ideological hegemony—via the ballot box or less desirable means—over society. The structural component involves the capacity to implement wise and effective policies to deliver development. Apart from technical capabilities, this also requires a strong state to resist pressures from powerful, short-sighted private interests. It also requires a ‘social anchor’ to restrain temptation to use its autonomy in a predatory manner. Key to the analysis is the realization that ‘developmental states’ can still fail. While the ‘right’ ideology and limits to predation might be in place, the capacity of the state to implement effective policies might not be enough to manage certain problems. Such problems may be driven by exogenous shocks, mistakes, or just old-fashioned bad luck. In this context, the aim should be to try and enhance the capacity to employ policy. Clearly, both the international financial institutions and the IOCs have a role in capacity building, although the primary responsibility must lie with the country itself.

A predatory state, by contrast, is one where the ruling élite is only interested in plundering the economy for its own ends. There are no counterbalancing forces, social anchors, or other constraints on its kleptocracy. Here the options to use policy to reverse the situation are limited. One option is for the IOCs not to invest. The problem with this solution is that there will be other companies, notably some NOCs, who will invest. The only other solution

is for some form of coordinated and cohesive international moves to prevent investment and to seek to change the behaviour of the ruling élite or, indeed, change the ruling élite. This is extremely complex and controversial. First, who decides who is predatory and upon what criteria? Second, the history of such multilateral action is not encouraging in terms of cohesion. Equally, the sort of unilateral action we have seen in Iraq has been a disaster, and a disaster that is likely to get far worse.

However, despite these difficulties it is an issue which needs to be resolved if we are to get the levels of investment in upstream capacity that the oil markets will require in the future.

(iii) Market Control and OPEC

As indicated in section II(ii) above, at the moment, because of relatively tight markets, OPEC is insulated from its traditional problems of trying to manage the market. Furthermore if new capacity fails to materialize, as suggested in sections IV(i) and (ii), this could continue for quite some time. However, from this view of the future several key issues emerge which have serious policy implications.

The first issue is what policy responses are possible if high oil prices continue and appear to be damaging levels of economic activity. Some policy solutions have already been discussed in sections IV(i) and (ii)—namely, encouraging greater investment by IOCs and NOCs, preventing IOC collusion, and encouraging greater opening of acreage. An alternative possible policy response discussed concerns the reaction of the Asian countries where oil demand growth is strongest—mainly China and India. It is already apparent that the growing Asian consumers of oil will seek to put funds into developing new sources. They may also gain attractive terms since they are much less constrained by ethical concerns when investing in certain countries. Thus there is less competition on the fiscal terms. Whether this sort of investment will be sufficient to maintain and increase crude-producing capacity, given the sorts of numbers being bandied around by the IEA, remains a moot point. It also raises fascinating issues to do with the geo-political consequences of such moves. In particular, the Chinese, with their obsession over supply security, will almost certainly

seek political influence and control in the countries where they seek to develop crude-producing capacity (Andrews-Speed *et al.*, 2002). It is quite feasible to imagine a world some 5–10 years down the road where China and the United States come head to head in the Middle East over securing political influence to ensure oil supplies, thereby reviving a version of the Cold War.

The ability of Saudi Arabia to manage the markets will determine future levels of price volatility. If volatility increases, this will produce a demand for a policy response, both in producer and consumer countries. The option of controlling paper markets, the major source of volatility, is a non-starter. At any hint of government control, the present trading arrangements can simply dissolve into cyberspace outside of any jurisdiction. A more plausible option is to revive the OPEC price band. This was created in 1999 as an automatic stabilizing mechanism. If the price moved outside the \$22–28 band for a specified period, OPEC would automatically increase or decrease production by a specified amount to force prices back into the band. Unfortunately, OPEC failed to honour the automatic nature of the mechanism and thus it became discredited. To further complicate its revival, there are currently demands from several members to increase the level of price bands and, in January 2005, OPEC formally announced the ‘suspension’ of the bands. If OPEC did decide to revive them, albeit at a higher level, and did acknowledge that it has to be used without discretion, this could stabilize prices, since it would effectively determine expectations. The problem would be to get agreement within OPEC on a new level for the bands

A policy area which is being explored to help stabilize prices both in terms of volatility and level, is the producer–consumer dialogue. This has a long history going back to the North–South dialogue of the 1970s (Fesharaki, 1990). In recent years it has been revived, largely as a result of the oil price collapse of 1997–9. However, it is difficult to see how such meetings can produce any realistic option to effect price since, by definition, this creates winners and losers, and potential winners would be unlikely to accept loss. Also while both sides may approve of price stability, consumers tend to favour stable low prices, and producers stable high prices.

An alternative option to manage price volatility lies in using paper markets to hedge. Certainly, a number of oil producers, including Mexico and Alaska, have used such paper markets (Lindahl, 1996). There are, however, complications. In theological terms, such activities in Islam are regarded as gambling and, therefore, forbidden, although often such problems can be circumvented. Also it is probably unrealistic for large producers to enter paper markets since this could swamp expectations, thus aggravating price volatility. Finally, buying such insurance inevitably costs. In particular, while spending money in such a way looks good if prices move in the 'correct' direction, if they move against the hedge, then this is seen as, at best, incompetence and, at worst, as signs of corrupt practices.

A variation on this theme would be to create stabilization funds which have been used both by oil-consuming countries, such as Korea and Taiwan, and by oil producers. However, in consuming countries, where sales taxes on oil products are very high, crude price volatility matters less, since the sales tax acts as a cushion between crude prices and the final price to the consumer. Given the growing tendency, described above in section II(i), for all oil importers to increase their sales tax levels, this implies that price volatility might become much less of an issue for consuming countries. As for stabilization/revenue funds for producers, these too are controversial (Fasano, 2000; Davis *et al.*, 2001; Devlin and Lewen, 2002). The argument is that, if conditions are conducive to independent and effective operation of a fund, then the problems can be managed within the existing fiscal mechanisms, and a separate institution is not required. But if conditions are not conducive, then such funds are prone to corruption and mismanagement and tend to raise unreasonable expectations on spending.

A second issue in this section is the observation, made in section II(iii), that supplies are becoming more concentrated in the Persian Gulf. One implication is that OPEC is likely to lose members. During the 1990s, two members—Ecuador and Gabon—left the organization. Technically, this year Indonesia should follow, as it moves from being a net exporter of crude to one of net imports. In both

Venezuela and Nigeria there are strong lobby groups who believe they should leave OPEC. If this were to happen, it might in theory make OPEC's ability to manage the market easier, since a smaller group might be expected to be more cohesive. However, counter to this is the observation that if market management involves pain as a result of having to close-in capacity to balance the market, a smaller group implies greater pain for each member.

An implication of growing concentration relates to supply security. In 2003, 47 per cent of world oil exports came from the Middle East and North Africa. As indicated in section II(i), the political stability in the region is perceived to be a source of concern and has begun the process of forcing governments to consider their policy response. Several broad policy areas are under consideration—reduce oil demand; develop alternative technologies; increase domestic supplies; diversify sources of oil imports; and, finally, build up strategic stocks.⁴ While such policies can be driven by security-of-supply concerns, they carry implications for other energy-policy objectives, such as environmental concerns.

The first policy option to solve security problems is to reduce the demand for oil. This, however, is more complex than it might seem. As indicated in section II(iii), since the oil price shocks of the 1970s, oil has been 'pushed out from under the boiler' (i.e. substituted in the static sector). Thus the only realistic option to try and reduce oil intensity lies in reducing its use in the transportation sector. For example, there is undoubtedly considerable scope for further improvements in automotive fuel efficiency, especially in the United States where the spread of sport utility vehicles (SUVs) has effectively undermined the Corporate Average Fuel Economy (CAFE) standards. However, reducing oil use in transport by means of policy will face problems. In terms of aircraft fuel, the international nature of the industry means any individual government would be ill advised to raise the price of jet kerosene either through sales taxes or price control. Aircraft would simply refuel elsewhere. In terms of gasoline and diesel, raising the final price to consumers remains a politically sensitive issue, as illustrated by the fuel

⁴ Policy responses to security-of-supply concerns are greatly complicated by the fact that there are many different perceptions of what the threat actually involves. For example, is it the threat of physical shortage or is it the threat of the macroeconomic consequences of higher prices resulting from a shortage?

protests in Western Europe in 2002. While there is undoubted scope to reduce gasoline and diesel use by imposing strict regulation of automotive fuel efficiency, this is often seen as unwarranted interference in the role of markets and consumer sovereignty.

One option would be to encourage alternative technologies for transport which used different fuels. This could also assist the environmental objectives to be discussed below in section IV(iv). Governments could play a key role—in part through funding basic research but also overcoming market failures. A good example relates to hydrogen-powered cars. Consumers are willing to buy such vehicles, but only if they can be reassured that filling stations will be easily available. Oil companies are willing to invest in such infrastructure but only if there are sufficient customers. This is precisely the sort of market impasse which can only be broken by government intervention, most obviously by the use of discriminating sales taxes (as has been the case to encourage the use of unleaded gasoline) and the provision of tax incentives for companies to invest in the needed infrastructure.

An alternative option to address security concerns, assuming the geology permits, is to increase domestic oil supplies. Several policy options are feasible. The first is to open up new areas for exploration. The most obvious example would be in the United States, where this was explicitly recommended by the Cheney Commission in 2001, with specific reference to the Alaskan Wild Life Refuge and other areas. The obvious problem here is a negative reaction from the environmental lobbies. The second option is to improve the fiscal terms for the oil upstream—in particular, in mature areas, to give tax breaks to encourage operators to increase the recovery factor on existing fields.

One other option is to try and diversify sources of imported oil. This can be achieved by allowing markets to function. In general, attempts by governments to secure supplies by attempting to promote bilateral relations with other countries have failed and proved expensive. The case of Japan presents a classic example (Koyama, 2001).

The final option is to develop strategic stocks. Since the mid-1970s, this has been achieved through the framework of the IEA's emergency stockpiling

system. This was boosted by the development of the USA's Strategic Petroleum Reserve after 1977. More recently, Asian oil consumers have also been developing a strategic stockpiling capability. One of the problems with this is that there is a great temptation for countries to free ride. Given the international nature of the oil market, a release of stocks by any individual will reduce prices, and this will benefit all players in the market. Thus the costs are borne by one country, while the benefits are shared by all (Leiby *et al.*, 2002).

(iv) Competition

Several policy issues arise in terms of competition in oil markets. One already referred to in section II(iv) is ensuring that breaking up the state control of the sector by privatization and deregulation does lead to competition in the downstream and midstream. One also concerns efforts to overcome the natural monopoly elements inherent in pipelines (Stevens, 1996). As more pipelines emerge, because of the growing need for trade, as outlined in section II(iii), this may become more of an issue than at present.

A new area for competition policy consideration relates to the outcome of the mega-mergers started in the late 1990s. There are several areas for concern. The first, already discussed, is the fact that the mergers have increased the monopsony powers of the IOCs in terms of the service industry. Thus the service industry is facing ever tighter margins, thereby inhibiting the willingness and ability to expand capacity. As developed in section IV(i) above, this could lead to problems in developing adequate capacity to meet expected demand.

The final competition issue relates to the Asian Premium outlined in section III(ii). Asian consumers can use policy to avoid the Premium. They could develop strategic stocks to give them confidence to move away from dependence on term contracts. They could also encourage crude oil from other suppliers to enter the region, most obviously encouraging pipeline supplies from Russia. Improving the competitive nature of crude and product markets in Asia would further assist the process. Many national oil markets in Asia retain strong elements of regulation and government interference. Regionally, Singapore is the only spot market in Asia and, compared to its US and European counterparts, the

volume of trading is small (Horsnell, 1997). Greater entry into world oil markets would further undermine the ability of the Middle East exporters to impose the Asian Premium. As for the Saudi policy dimension, the key is its willingness and ability to impose destination clauses in its sales contracts. It is not clear why they would be willing to undermine a system which is worth a very large amount of revenue. However, a key will be Saudi entry to the World Trade Organization (WTO), since it seems very likely that the WTO would have serious problems with such destination clauses (Desta, 2003).

(v) The Environment

Environmental issues play a crucial role in oil markets and will remain a central dimension of policy because environmental concerns dominate all stages of the industry. In the production of crude, there are issues of access to 'wilderness' areas plus the negative impact of operations, ranging from gas flaring to the disposal of drilling muds. Environmental policy outcomes in the upstream, all of which will increase production costs and reduce supply, will depend upon the extent to which other policy drivers, most obviously supply security, supersede environmental concerns. In midstream transportation, there are problems of pipeline leakages and tanker accidents. Increasingly, restrictions are being placed upon the specifications for tankers before they are allowed into territorial waters. In the downstream, there is growing regulation restricting refinery operations, notably flaring and closures. Because of the environmental costs of refinery closure, in the future it is extremely unlikely that any refinery will actually close. Rather, they will cease formal refining operations but remain designated as 'refineries'. One important consequence of this will be that statistics regarding refinery capacity will need to be treated with some circumspection.

At the same time, concerns regarding emissions as a result of burning oil products are creating serious pressures for tighter environmental policy. The most general and widespread regulations are with respect to sulphur content in diesel. Throughout the world these are being tightened, thus giving something of a boost to gas-to-liquids technology, which produces a sulphur-free diesel. Gasoline specifications are also a subject of policy interest, notably in terms of the 'boutique fuel problem' in the USA.

The United States Clean Air Act of 1990 allowed individual jurisdictions to formulate their own gasoline specifications. The result has been a plethora of different gasolines. In 1974, there were five gasoline specifications, today there are over 55. The result has been a fragmentation of the domestic gasoline market, resulting in very large price differentials between regions. The normal operations of arbitrage between regions or, indeed, with countries outside the United States, have been suspended because of the growing differentiation of the product. Given the political sensitivity of gasoline prices in the United States, this problem is already attracting public attention and there are growing pressures for a rescinding of the ability to specify gasoline on such a micro basis. More generally, in many developing countries the issue is reducing the lead content in gasoline and this will continue to be an increasingly important issue, not least because the negative effects of lead are well established and well understood, and there are many feasible solutions. There are also new pressures for the lowering of sulphur content in heavy fuel oil.

Finally, there are the issues related to the emission of greenhouse gases. Based on carbon dioxide (CO₂) emissions, in a world of a true carbon tax, arguably oil would do rather well, given its lower emissions compared to coal. However, both in the United States and in the European Union, carbon-tax proposals have invariably tried to give protection to domestic coal, thereby disadvantaging oil. Similarly, in large coal consumers such as India and China, it is inconceivable that a carbon tax would be imposed resulting in significant increases in oil imports. However, the current high-price-oil world is likely to encourage less oil use and, therefore, less CO₂ emissions. Arguably, the gap between the marginal costs of producing oil and the current price levels are greater than the optimal levels that would be set for a carbon tax. OPEC and the control of the oil market have effectively internalized the costs of the greenhouse-gas externalities.

In terms of markets, other policy means to internalize all these externalities outlined above, either through regulation or some form of permit trading, all involve the industry in greater cost and a requirement for ever greater investment. This creates a serious problem in the downstream, because it has experienced an extremely poor record of

Table 1
Issues in the International Oil Market Which are Likely to Prompt Demands for a Policy Response

Supply concerns	<ul style="list-style-type: none"> • Insufficient investment by IOCs returning funds to shareholders • Insufficient investment by NOCs because of rent-seeking • Fiscal terms not providing enough incentive to invest • Constraints upon the service industry • Restrictions on access to upstream acreage • Fears of ‘resource curse’ inhibiting investment • Growing dependence on the Middle East and North Africa • Fears of terrorism affecting supplies • Fears regarding the future growth of Russian oil supplies • Need to clean up operations in all stages of the value chain
Demand concerns	<ul style="list-style-type: none"> • Increasing need for fuel oil ‘destruction’ • Need to limit demand growth to lower prices • Need to limit demand growth to reduce dependence • Need to limit demand growth for environmental reasons • Need to clean up product emissions
Market concerns	<ul style="list-style-type: none"> • Need to improve market efficiency • Increased industry concentration following M&A activity • OPEC and Saudi Arabia’s ability to manage the market • Saudi Arabia’s oil policy • Higher prices and their impact on economic activity • Growing crude oil price volatility • The Asian premium

profitability. This problem of increased investment to meet green regulations is reinforced when it is remembered that, as explained in section II(iii), the demand for the heavy end of the barrel is on terminal decline, forcing ever more investment in extremely expensive upgrading facilities. The process of tightening environmental regulation in the downstream is likely to aggravate the growing problem of lack of refinery capacity, which, in turn, is encouraging higher refinery gate prices, irrespective of what is happening to the price of crude oil. This could create a public backlash against growing green legislation, especially in areas where oil product prices are already a sensitive political issue.

V. CONCLUSION—CHALLENGES OF USING POLICY

There are, potentially, a large number of areas relating to the oil market that are likely to cause the sort of popular concern which will demand a policy

response. Table 1 summarizes the issues which have been identified in this paper.

In outlining these issues of concern, the paper has tried to outline the various policy options available. However, the effectiveness of any policy response will be constrained by a number of factors.

- Following the oil shocks of the 1970s, many of the easy policy options have been already been implemented, especially in the OECD. For example, oil intensities, have fallen significantly (IEA, various years). Specifications have become tighter, producing much cleaner products etc. Thus the costs of policies are certain to rise exponentially as the objectives turn to the ever harder targets.
- There is a lack of agreement over the causes of many of the issues of concern. For example, if higher prices are largely the result of cyclical factors, then the solution lies in leaving it to the

market. What goes up will eventually come down. However, if, as this author believes, structural factors are more important, then this would require a policy response. Leaving it to the market would not solve the problem of higher prices.

- The international nature of the oil market limits the effectiveness of national policy. There are two dimensions. First, there is the inevitable problem of free riding. For example, the release of strategic stocks will lower oil prices following a price shock. However, because oil is a global market the lower prices benefit all. Thus there is no incentive to incur the very considerable costs associated with strategic stockpiling. Second, the international nature of the industry inhibits unilateral action. For example, taxes on jet kerosene to internalize the externalities associated with air travel would simply not work, except possibly if it were introduced into the North American Free Trade Agreement (NAFTA), where alternative fuelling options would be very limited.
- However, the main constraint on any policy solution arises from domestic politics in the countries concerned. The policy options which

are available are, for the most part, likely to be politically very unpopular. For example, in the case of the UK, proposals to introduce road pricing, which would be an obvious solution to traffic congestion, increased gasoline consumption, and consequent pollution, is described in political circles—but not publicly—as ‘the poll tax on wheels’.⁵ Thus the future faces a serious dilemma. On the one hand, there are the issues listed in Table 1, which will produce domestic political pressure for policy. But, on the other hand, the only viable and effective policy options will be politically unpopular. In such a world, the commonest response from governments is to obfuscate and delay. However, meanwhile, the very real problems in Table 1 will accumulate and are unlikely to go away of their own accord. The implication is that only a major international crisis will sweep away the political constraints upon effective policy. While the Middle East is very likely to supply this, it is a sad reflection that we must solve our problems at the expense of others’ misery. Furthermore, the probable lack of a coherent and urgent policy response simply makes the crisis both more probable and more dramatic than it might otherwise be.

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⁵ For non-UK readers or young UK readers, the ‘poll tax’, or community charge, was introduced by Margaret Thatcher in 1985. It proved so unpopular it is widely credited with ending her role as Prime Minister in 1990.

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