



OPEC Pricing Power

The Need for a New Perspective

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1. INTRODUCTION

Since the 1973 oil price shock, the history and behaviour of the Organization of Petroleum Exporting Countries (OPEC) have received considerable attention both in the academic literature and in the media.¹ Many conflicting theoretical and empirical interpretations about the nature of OPEC and its influence on world oil markets have been proposed. The debate is not centred on whether OPEC restricts output, but the reasons behind these restrictions. Some studies emphasize that production decisions are made with reference to budgetary needs which in turn depend on the absorptive capacity of the domestic economies (Teece, 1982). Others explain production cuts in the 1970s in terms of the transfer of property rights from international oil companies to governments which tend to have lower discount rates (Johany, 1980; Mead, 1979). Others explain output restrictions in terms of coordinated actions of OPEC members. Within the literature, OPEC behaviour ranges from classic textbook cartel to two-block cartel (Hnyilicza and Pindyck, 1976), to clumsy cartel (Adelman, 1980), to dominant firm (Salant, 1976; Mabro, 1991), to loosely co-operating oligopoly, to residual firm monopolist (Adelman, 1982) and most recently to bureaucratic cartel (Smith, 2005). Others have suggested that OPEC oscillates between various positions but always acts as a vacillating federation of producers (see for instance Adelman, 1982; Smith, 2005). The existing empirical evidence has not helped narrow these different views. Griffin's (1985) observation in the mid-1980s that the empirical studies tend to "reach onto the shelf of economic models to select one, to validate its choice by pointing to selected events not inconsistent with model's prediction" still dominates the empirical approach to studying OPEC behaviour and its pricing power.²

In this paper, we examine OPEC's ability to influence oil prices. As in any other issue related to OPEC, there are divergent views regarding its pricing power. More importantly, there seem to be switches in perceptions shifting from one end where OPEC is perceived to play no role or a very limited role to the other where it is perceived to be a price-setter. These switches in perception became very apparent in the events that surrounded the oil price collapse in 1998³ and the oil price hike in 2004. In 1998, when the Dubai price approached \$10 per barrel, many observers claimed that OPEC had lost its ability to defend oil prices with many observers predicting its demise. This view of an ineffective OPEC was however reversed only a few months later with many observers in the media considering the events of 1997 as inducing great cooperation among members and ushering in a new era.⁴ During March 1998 and March 1999, OPEC embarked on two production cuts in an attempt to put an end to the slide in oil prices. These production cuts were implemented with a high level of cohesiveness among members, contradicting the view that OPEC is not able to implement cuts.⁵ In the high oil price environment of 2004, there was another switch in perception where doubts re-emerged about OPEC's pricing power. But unlike

¹ For a historical account of OPEC see Skeet (1988), Terzian (1985) and Seymour (1980). For a comprehensive review of the theoretical literature, see Gately (1984), Crémer and Salehi-Isfahani (1991) and Mabro (1998a).

² See Smith (2005) for a more recent review.

³ See Mabro (1998b) for an insightful discussion of the 1998 oil prices.

⁴ See for instance, Stanley Reed, "Cheap Oil? Forget It", *Business Week*, 3/8/2004, Issue 3873.

⁵ This has led some observers to question how OPEC "suddenly acquired new powers in March 1999, having been unable to force a sustained increase in oil prices since 1986, and how the same cartel just two years later seemed to be on the verge of collapse" (Barsky and Kilian, 2004, p.125).

the events surrounding 1998, the loss of pricing power in 2004 was mainly attributed to OPEC's loss of excess capacity.

The events of the last few years highlight some important observations that are essential to understanding OPEC behaviour. First, OPEC's pricing power is not constant, but varies over time. There are many instances in which the organization can lose power to influence oil prices. Second, this change in pricing power is induced by market conditions and can occur both in weak and tight market conditions. This does not imply that market participants can afford to ignore OPEC. In fact, OPEC has succeeded in many instances in implementing production cuts to prevent declines in oil prices. Also OPEC (and, more specifically, Saudi Arabia) has succeeded in offsetting the impact of sudden disruptions of supply and in moderating the rise in oil prices.⁶ Third, pursuing output policies has become more complicated with the growing importance of the futures market in the process of oil price discovery. The effectiveness of any policy depends to a large extent on the ability of OPEC to influence participants' expectations in the futures market (Fattouh, 2006a). Finally, long-term investment plans can have important implications for OPEC's continuing pricing power. Many international organizations such as the International Energy Agency (IEA) and Energy Information Administration (EIA) project greater reliance on Middle Eastern oil in the next two decades and hence they predict a distinct increase in the market share of Middle Eastern oil exporters. This is seen to have the effect of automatically increasing OPEC's market power. However, we argue that OPEC may not have the incentive to invest. Even if member countries decide to invest, there are serious bottlenecks that may prevent this investment from taking place.⁷ Finally, even if the investment does materialize and OPEC market share rises markedly, its ability to influence prices does not automatically follow.

This paper is divided into six sections. In Section 2, we provide a brief account of the evolution of the international oil pricing system, emphasizing the recent shift to the futures market for oil price determination. In Section 3, we discuss OPEC's current role in the market and the failure of theoretical models to take into account three major features in their analysis: the varying conduct hypothesis, the asymmetric response to global market conditions and the signalling mechanism. In Section 4, we discuss the implications of IEA and EIA projections that the world is likely to become more reliant on Middle Eastern OPEC producers. We assess whether OPEC has the incentive to increase its market share and whether the investment to meet projected demand will materialize, discussing briefly some of the factors that can hinder investment. In Section 5, we discuss Saudi Arabia's position in the oil market. Section 6 concludes.

⁶ This was clearly evident during 1990 when OPEC offset the loss from Iraq and Kuwait exports and also in 1979–1980 when political developments surrounding Iran resulted in panic buying.

⁷ See Fattouh and Mabro (2006) for a discussion on the under-investment problem in the oil sector.

2. THE EVOLUTION OF THE OIL PRICING SYSTEM: A BRIEF HISTORICAL ACCOUNT

From the discovery of oil in the Middle East at the beginning of the twentieth century until the early 1970s, OPEC member countries played no role in the production or pricing of crude oil.⁸ Governments simply received a stream of income calculated on the basis of ‘posted’ price (Mabro, 1984). Being a fiscal parameter, the posted price did not respond to the usual market forces of supply and demand and hence did not play any signalling role. Other prices such as spot and long-term contract prices played a very limited role in price discovery due to the vertically and horizontally integrated industrial structure dominated by the large multinational oil companies known as the Seven Sisters. This meant that oil trading became, to a large extent, a question of inter-company exchange with no free market operating outside the control of these companies. Multinational oil companies used to balance their positions on the basis of long-term contracts, but the prices in these contracts were never disclosed.

By the late 1950s, changes in the oil market, such as the arrival of independent oil companies that were able to obtain access to crude oil outside the control of the Seven Sisters and the arrival of crude oil from the former USSR, started to challenge the dominance of the multinational oil companies. However, these changes never posed a serious threat to the Seven Sisters or to the posted price system. At the same time, OPEC countries were too weak to change the existing pricing regime. Thus, the multinational oil companies maintained their dominance both in the upstream and downstream parts of the industry for most of the 1960s (Penrose, 1968).

It was not until the early 1970s that the oil pricing system witnessed a major transformation which saw the price setting power shift from the multinational oil companies to OPEC. This transformation was driven by an array of factors, the most important of which is the tight supply–demand conditions that emerged in the early 1970s. Between 1970 and 1973, global demand for oil increased at a fast rate with most of the increase in demand met by OPEC countries. This enhanced the power of OPEC governments relative to the multinational oil companies, and governments began seeking higher stakes on their oil sales. In October 1973, after negotiations with multinational oil companies to increase oil prices failed, the six Gulf members of OPEC unilaterally announced an immediate increase in the posted price of the Arab light crude from \$3.65 to \$5.119. In December 1973, OPEC raised the posted price of the Arab light further to \$11.651. These events represented a dramatic change in the pricing system. For the first time in its history, OPEC assumed a unilateral role in setting posted prices while previously it had only been able to prevent oil companies from reducing them (Skeet, 1988). At the centre of the new pricing system was the marker or reference price with individual member countries setting their prices in relation to the price of the Arab light, which became the marker crude.

Another important development in the early 1970s that had direct implications on the pricing system was the decision of OPEC governments to stop granting new concessions⁹ and claim equity participation in the existing concessions, with a few of them opting for full nationalization (Algeria, Iraq and Libya). Equity participation

⁸ This section is based on Fattouh (2006b).

⁹ As early as 1957, Egypt and Iran started turning away from concessions to new contractual forms such as joint venture schemes and service contracts. In 1964, Iraq decided not to grant any more oil concessions (Terzian, 1985).

gave OPEC governments a share of the oil produced which they had to sell to third-party buyers on the basis of official selling price (OSP) or government selling price (GSP) (Mabro, 1984). However, for reasons of convenience, lack of marketing experience and inability to integrate downwards into refining and marketing in oil-importing countries, as part of the equity participation agreements governments made it compulsory to sell the oil at buyback prices to the companies that had originally held the concessions.

Equity participation and nationalization of oil resources profoundly affected the structure of the oil industry. During the late 1970s, multinational oil companies lost large reserves of crude oil and became increasingly dependent on OPEC supplies. The degree of vertical integration between upstream and downstream weakened considerably as companies no longer had enough access to crude oil to meet their downstream requirements. This encouraged the development of an oil market outside the inter-multinational oil companies trade and pushed companies to diversify their sources of oil supply by gaining access to and developing reserves outside OPEC.

In the early 1980s, new discoveries in non-OPEC countries responding to higher oil prices and taking advantage of new technologies meant that significant amounts of oil began to reach the international market from outside OPEC. According to the EIA (2005), between 1975 and 1985 non-OPEC countries increased their share of world total oil production from 48% to 71% with most of the increase coming from Mexico, the North Sea and the Soviet Union. The increase in non-OPEC supply had two main effects. First, non-OPEC countries were setting their own prices which were more responsive to market conditions and hence more competitive. Second, the number of crude oil producers increased dramatically. The new suppliers of oil who ended up with more crude oil than required by contract buyers secured the sale of all their production by undercutting OPEC prices in the spot market. Buyers who became more diverse were attracted by the competitive prices on offer, which were below the long-term contract prices.

It became clear by the mid-1980s that the OPEC-administered oil-pricing regime was unlikely to survive these competitive pressures for long. OPEC's, or more precisely Saudi Arabia's, attempts to defend the marker price would only result in a dramatic reduction in its oil exports and loss of market share as other producers could offer to sell their oil at a discount to the Arab light. As a result of these pressures, OPEC saw its own market share in the world's oil production fall from 52% in 1973 to less than 30% in 1985 with Saudi Arabia's share being the most affected. In an attempt to restore the country's market share, Saudi Arabia adopted the netback pricing system in 1986 (Mabro, 1986). The netback pricing system provided oil companies with a guaranteed refining margin since it was based on a general formula in which the price of crude oil was set equal to the *ex post* product realization minus refining and transport costs. The netback pricing system resulted in the 1986 price collapse, from \$26 per barrel in 1985 to less than \$10 per barrel in mid-1986. Out of the 1986 crisis, the current 'market-related' oil-pricing regime was born. The adoption of the current market-related pricing system represented a new chapter in the history of oil price determination since it resulted in the abandonment of the administered oil pricing system that had dominated the oil market from the 1950s until the mid-1980s.

The current market-related oil-pricing regime is based on formula pricing, in which the price of a certain variety of crude oil is set as a differential to a certain marker or reference price. The emergence and expansion of the market for crude oil allowed the

development of market-referencing pricing off spot crude markers such as spot West Texas Intermediate (WTI) (initially Alaska North Slope), dated Brent and Dubai. The declining liquidity of the reference crudes has, however, raised doubts about their ability to generate a marker price that accurately reflects the price at the margin of the physical barrel of oil. First, it is often argued that thin and illiquid markets are more susceptible to distortions and squeezes. Second, in such markets where actual deals are infrequent and irregular, the number of price quotations for actual transactions is quite small. But for crude oil to act as a reference or benchmark, price quotations should be generated on a regular basis. For a regular flow of price quotes and daily price assessments of reference crudes, markets rely on oil price reporting agencies for price discovery.¹⁰

The declining liquidity of the physical base of the reference crude oil and the narrowness of the spot market have caused many oil-exporting and oil-consuming countries to look for an alternative market to derive the price of the reference crude. The alternative was found in the futures market. When formula pricing was first used in the mid-1980s, the WTI and Brent futures contracts were in their infancy. Since then, the futures market has grown to become not only a market that allows producers and refiners to hedge their risks and speculators to take positions, but is also at the heart of the current oil-pricing regime. Thus, instead of using dated Brent as the basis of pricing crude exports to Europe, several major oil-producing countries such as Saudi Arabia, Kuwait and Iran rely on the IPE Brent Weighted Average (BWAVE).¹¹ The shift to the futures market has been justified by a number of factors. Unlike the spot market, the futures market is highly liquid which makes it less vulnerable to distortions. Another reason is that a futures price is determined by actual transactions in the futures exchange and not on the basis of assessed prices by oil reporting agencies. Furthermore, the timely availability of futures prices, which are continuously updated and disseminated to the public, enhances price transparency.

In brief, the oil pricing system witnessed major transformations in the last 50 years or so which saw the oil market shift from the administered oil pricing system first governed by multinational oil companies and then governed by OPEC to a market-related system in which oil was initially priced off the spot market until the futures market assumed a greater role in price discovery. This had important implications on the pricing power of OPEC, as will be explained in the following section.

¹⁰ In their assessment, oil price reporting agencies obtain information from market participants about the deals concluded and the bids and offers made. In order to provide reliable price assessments, reporters should observe plenty of arm's-length deals between market participants. Since market participants have different interests and different positions (short or long), it is very unlikely that they would reveal the actual price used in the deals. In a liquid market, this can be less of a problem since by pooling information from different participants biases could cancel out (but not necessarily).

¹¹ The BWAVE is the weighted average of all futures price quotations that arise for a given contract of the futures exchange (IPE) during a trading day. The weights are the shares of the relevant volume of transactions on that day. Specifically, this change places the futures market, which is a market for financial contracts, at the heart of the current pricing system.

3. OPEC, THE MARKET AND OIL PRICES

At first sight, it may seem that OPEC plays a very limited role in the formation of oil prices. OPEC countries, like other oil exporters, just take the market price from the spot market (and, more recently, from the futures market) and plug it in the pricing formula to arrive at the price at which they sell their oil. But this simple description does not provide a realistic portrayal of OPEC's role in price formation. By changing production quotas, the organization and its dominant player Saudi Arabia are bound to have an influence on oil prices.

OPEC sets production quotas based on its assessment of the market's call on its supply. Oil prices fluctuate in part according to how well OPEC performs this calculation. Through the process of adjusting its production quotas, OPEC can only hope to influence price movements towards a target level or target zone. In a supply–demand framework, the oil price is determined by OPEC and non-OPEC supplies as well as oil arriving to the market from OPEC members who do not abide by the assigned quotas. Since these supplies cannot be predicted with accuracy and are influenced by factors other than prices, OPEC can only hope that the resulting oil price is close to its preferred price. In this context, models that consider OPEC simply as a price setter to maximize the net present value (NPV) of oil receipts over time are of limited usefulness (see, for example, Pindyck, 1978).¹² Mabro (1991) notes

“... the revenue maximization objective which theory postulates and core producers would dearly like to achieve is not credible. One has to become content with a second best: to obtain through the pricing policy more revenues than would have accrued under a competitive market structure. This more may be much better than nothing but is likely to be very different from the optimum.”

From a very different perspective which emphasizes the bureaucratic nature of OPEC, Smith (2005) argues that “OPEC acts a bureaucratic cartel; i.e. a cooperative enterprise weighed down by the cost of forging consensus among members and therefore partially impaired in pursuit of the common good” (p.74).

Achieving the desired price level to acquire ‘more’ revenues has become more difficult in the current context in which prices are increasingly being determined in the futures market. OPEC's influence on prices is now dependent on the expectations of participants in the futures markets. In principle, quota decisions can be viewed as signals to the market about OPEC's preferred range of prices. It is important to stress that this signalling mechanism may or may not succeed, depending on how the market interprets these signals. Specifically, the effectiveness of the signal will depend on whether the market believes that OPEC is able to undertake the necessary output adjustment in different market conditions.

Although OPEC has on many occasions succeeded in defending the oil price, adjusting output downward has sometimes proven to be unsuccessful. If global demand for oil falls, non-OPEC suppliers will continue to produce at their maximum potential. In their attempt to defend a target price, OPEC members would call for production cuts. However, because of the different features, needs and bargaining

¹² Pindyck (1978) considers a model in which OPEC is a monopoly owner of an exhaustible resource. The behaviour is highly predictable: OPEC would choose prices or quantities such that the marginal revenue minus marginal extraction cost would increase at the rate of interest. In Gately's (1984) words: “even a dumb OPEC have to set its price so as to satisfy the appropriate Hotelling conditions”.

power and the divergent interests of member countries, OPEC cannot usually reach agreements on allocation of production cuts. Even when agreements are reached, each member has the incentive to go against these decisions. Because of the absence of a monitoring mechanism, these violations are not usually detected and even if they are, the organization does not have the power to punish and force member countries to abide by the agreed production cuts (see, for example, Kohl, 2002; Libecap and Smith, 2004). These problems become more acute when the required cuts are significant as the small OPEC members usually find it difficult to reduce their production on a pro-rata basis: the usual system adopted by OPEC over the years. In these circumstances, market participants would doubt the credibility of OPEC's decision to cut production and may decide to ignore the signal. This is particularly true if there are deep divisions and political rivalries among member countries which will jeopardize the success of any coordination efforts. Lack of transparency about the decision-making processes and lack of information about production and investment reduces the credibility of the signal.

Adjusting output in the face of growing global oil demand can also be problematic, although for different reasons. Although agreements to increase quotas are easier to reach and implement when global demand is rising, OPEC may not respond quickly to this upward trend in an environment of imperfect information and uncertainty about future demand. After all, the decision to wait and not increase output is more profitable than to increase output when the trend may turn out to be false. Expecting that, market participants may ignore the signal of an output increase, considering such a move as not being credible.

The rise in global demand for oil can impact on OPEC's pricing power through another channel: the erosion of spare capacity. Since the early 1990s, the year-to-year increase in global oil demand has outpaced the increase in non-OPEC supply in almost every year (exceptions were 2000, 2001 and 2002 which saw large increases in Russian oil production). In fact, over the period 1990–2004, global demand for oil increased by around 16 mbd, while the increase in non-OPEC supply amounted to only around 6 mbd. The difference between the increase in global demand and non-OPEC supply had to be met by OPEC. During 1990–2004, the organization supplied the additional 10 mbd, with production in 2004 reaching around 33 mbd. The impact of the increase in demand for OPEC oil has been the gradual decline in OPEC spare production capacity, a process which accelerated in the 1990s and early 2000 (Fattouh, 2006a). In addition to these demand and supply dynamics, the reduction in sustained capacity in some OPEC member countries contributed to the loss of spare capacity. Other factors contributing to the erosion of production capacity include: strikes by oil workers in Venezuela; sanctions in Iraq, Iran and Libya which resulted in long periods of under-investment; and Indonesia's failure to arrest production declines. When the majority of OPEC members are producing at or close to their maximum capacity, OPEC has no influence on oil prices and its core producer Saudi Arabia ceases to be price maker. This problem can be compounded by market scepticism about OPEC's spare capacity and its ability to raise production as events in 2004 have shown. Doubts about the ability of the dominant producer Saudi Arabia to supply the market with additional supplies of the required quality of crude rendered any OPEC announcements of production increases ineffective. This led *The Economist* to comment that "Ali Naimi, the Saudi oil minister, usually moves markets when he

speaks. Yet when he promised a few days ago that more oil is on the way, traders ignored him and the rally continued apace.”¹³

This leads us to the analysis of the price band mechanism which OPEC adopted in 2000 as a signalling mechanism. This mechanism set a target range for the OPEC basket price between US\$22 and US\$28 per barrel of oil. If prices are below the floor for ten consecutive days, OPEC will automatically cut production. If prices are above the upper band for twenty days, it will automatically increase production. Recently, various studies have examined OPEC pricing policies within a target price zone providing a rationale for the lower and upper bands (Tang and Hammoudeh, 2002; Chapman and Khanna, 2001; Horn, 2004). For instance, Horn (2004) explains the floor in terms of OPEC’s position as a partial monopolist in the oil market. He argues that lower prices are probable only if the OPEC cartel breaks up. As to the upper band, it is set such that it prevents stimulation of production of unconventional oil based on oil sand or coal. He thus predicted that crude oil prices above \$30 per barrel are therefore not sustainable for a long period. Recent events, however, have shown the invalidity of the target price zone. Specifically, OPEC will not respond by increasing supplies if price exceeds the upper band. Furthermore, in a very tight market when spare capacity is very low, the upper band becomes irrelevant as OPEC will not be able to defend it. The most important feature of the price band is therefore the floor, as in principle OPEC will be able to defend it by cutting production. The difficulty of managing such a price target zone in a tight market led OPEC to suspend its five-year-old oil price band mechanism in January 2005.

Thus, although OPEC sends signals to the futures markets their impact depends on participants understanding their implications and their perceptions of the credibility of the policy. In fact, this hypothesis has recently received some empirical support. Wirl and Kunjundzic (2004) investigated if OPEC still influenced the oil market by examining if the decisions made at the OPEC conference exert any influence on oil prices. Using data for the period 1984–2001, they found that the impact of OPEC decisions on oil prices is weak and if there is any impact, it is restricted to decisions that call for price increases. The authors argue that this result could be due to three reasons:

“(i) sufficient information is leaked prior to the meeting so that the official Conference reveals hardly any new information; (ii) news show up only in data with higher, say hourly, frequency; (iii) the Conference lacks credibility that the agreed upon policies will be actually carried out by the individual member countries” (p.60)

OPEC’s pricing power is not straightforward. Any theoretical and empirical model should take into account the following three features. First, OPEC behaviour is not constant and can exhibit variation in conduct with important implications on price dynamics in the oil market. In this respect, the study by Geroski *et al.* (1987) represents an important but lonely contribution. Using quarterly data from 1966 to 1981, they find evidence which is consistent with variation in conduct.

Second, OPEC’s influence is asymmetrical depending on whether it is responding to rising or falling global oil demand. In fact, a large literature developed on whether firms find it more difficult to collude during booms or recessions (Rotemberg and Saloner, 1986; Haltwinger and Harrington; 1991; Staiger and Wolak, 1992; Bagwell

¹³ The Economist, “Unstoppable? How OPEC’s Fear of \$5 Oil Led to \$50 Oil”, August 21, 2004.

and Staiger, 1997). The main intuition within the literature is that changes in demand conditions affect the one-shot deviation gains, the losses of future collusive profits and the future cost of being punished which directly affect the sustainability of collusive outcomes. Haltwinger and Harrington (1991) find that under certain assumptions of constant and symmetrical marginal costs, a firm's incentives to deviate are stronger when future demand is falling. This is due to the fact that the value of the foregone collusive profits is smaller when demand is falling than when demand is rising. Thus, according to their model, it becomes more difficult to sustain collusion under decreasing demand. However, this clear-cut result is less so if capacity constraints are introduced into the picture. For instance, Fabra (2003) shows that when firms face severe capacity constraints, demand fluctuations can also have an impact on the future cost of being punished. When firms are operating close to their maximum capacity, the future costs of being punished are lower while the large excess capacity in face of decline in global demand implies that the future cost of being punished is high. This can make collusion more difficult during booms rather than recessions. Incorporating these and similar insights into OPEC models can prove quite useful.

Third, the shift to the futures markets for price determination has introduced a large number of players and the large variety of participants (floor traders, fund managers, refiners, producers, financial institutions and speculators) has certainly complicated the process of decision-making within OPEC.¹⁴ OPEC's influence on prices has become dependent on the expectations of these participants and how they interpret OPEC signals. In standard signalling models, informed agents communicate private information indirectly via choices of observable actions. Because the choices made are costly, signalling becomes credible. The signalling hypothesis has been successfully applied to a large number of issues including banking, corporate finance, macroeconomic and monetary policy and industrial organization.¹⁵ However, these traditional models of signalling may not be appropriate in this context. First, OPEC communication with the market is directly through public announcements. Second, different from traditional models of signalling, OPEC signals are without cost. This raises the question whether any information can be credibly transmitted when signalling is without cost and direct. This issue has been extensively analysed within the context of 'cheap talk' in game theory (Crawford and Sobel, 1982; Farrell and Rabin, 1996). The insights from this literature can be very useful in studying OPEC relationship with the market. The main shortcoming however is that 'cheap talk' models are characterized by a multiplicity of equilibria ranging from the 'babbling' equilibrium in which recipients consider all signals to be meaningless to the more informative equilibrium. However, Crawford and Sobel (1982) show that informative equilibria still entail a significant loss of information. The literature examines some of the measures that can be used to limit information loss.

¹⁴ The list of factors that OPEC has used to explain its decisions since 1999 has expanded to include not only the level of oil price, but also the open interest position of non-commercial traders on the futures market and the level of stocks (Garcia, 2005; Mabro 2005). See Fattouh (2007) on the dilemma that OPEC faces in the current market conditions.

¹⁵ For early applications, see Ross (1977) and Leland and Pyle (1977). Leland and Pyle (1977) for instance argue that by not selling their entire project to outside investors, entrepreneurs of type G (good entrepreneurs) can send clear signals about the quality of their project. But this signalling act is costly since it entails risk-averse agents (who have a strong preference not to take any risk and sell the project in its entirety) to invest part of their wealth in the project.

4. THE DEPENDENCE ON MIDDLE EASTERN OIL AND PRICING POWER

Many international organizations such as the IEA and EIA projected that most of the increase in global demand for oil would be met by OPEC, especially Middle Eastern producers within OPEC which implies greater reliance on Middle Eastern oil. This would require that oil exporters increase their investment outlays or open their oil and gas sectors to foreign investment. In an exercise which focuses on Middle East and North Africa (MENA) oil and gas resources, the IEA (2005) projects in the reference scenario a rise in MENA oil production from the 2004 level of 29 mbd to 33 mbd in 2010 and 50 mbd in 2030. In this scenario, Saudi Arabia will remain the largest supplier increasing its output from 10.4 mbd in 2004 to 11.9 mbd in 2010 and over 18 mbd in 2030. A second important player would be Iraq, which is expected to witness the second fastest production growth after Saudi Arabia. The IEA envisages that MENA's share of world oil production would increase from 35% in 2004 to 44% in 2030 with four countries (Iraq, Kuwait, the UAE and Libya) increasing their share. However, the IEA warns that this requires doubling of annual upstream investment in MENA which it is not certain will take place because "MENA governments could choose deliberately to develop production capacity more slowly...or external factors such as capital shortages could prevent producers from investing as much in expanding capacity as they would like". The IEA claims that MENA producers would lose out by not making these investment commitments because higher revenues owing to a rise in oil prices would not compensate for the loss in revenue owing to lower export volumes.

Such developments would have important implications for oil prices and OPEC's pricing power. First, low investment in OPEC, especially in the large Middle Eastern exporters within OPEC, can lead to sharp rises and more volatile oil prices. Second, these scenarios predict that the OPEC's share in the global oil market would rise drastically. Third, the above implies a reduction in the elasticity of supply outside core producers such that there will be a smaller supply response from non-OPEC to rises in oil prices. The last two factors may have important implications on pricing power depending on the OPEC model used. For instance, in the dominant firm model, OPEC's power depends on the elasticity of world demand for oil, the elasticity of the supply of the competitive fringe and OPEC's share in the world market. With predictions of increasing market share, lower non-OPEC supply elasticity and more inelastic global oil demand, the model implies a greater OPEC pricing power.

Rather than focusing on the implications of the different scenarios on pricing power, we take a different approach and address the following questions. First, will OPEC seek to increase market share without any regard to price implications? Second, will the investment required to increase market share materialize? Third, assuming that OPEC decides to seek and is successful in achieving a larger market share, does more reliance on Middle Eastern oil necessarily imply that OPEC would have greater pricing power?

4.1 The Incentive to Increase Market Share

The projections about OPEC supply made by the IEA and EIA are not based on any behavioural analysis or any of the theoretical models that try to describe OPEC behaviour. Rather, these are derived from a simple accounting formula that balances world demand after taking into account various factors. The following quotation from EIA International Energy Outlook (2006) makes this idea clear:

“... to develop the reference case an initial world oil price path was assumed for the 2010 to 2030 period. Future total world oil demand was then estimated on the basis of that price path and assumptions about future economic growth. The assumed price path was also used to estimate future non-OPEC production of conventional oil and production of unconventional liquids from both OPEC and non-OPEC countries, based on estimates of the total petroleum resource base. Finally, the level of OPEC conventional production that would be needed to balance world oil markets for the assumed reference case price path was calculated by subtracting non-OPEC conventional supplies and total unconventional supplies from total world oil demand.” (p.28)

Although this simple approach overcomes the problem of modelling OPEC’s complex behaviour, it has been widely criticized. The above scenarios implicitly assume that OPEC has the incentive to increase market share without any regard to oil prices. Specifically, it has not been investigated if the projected output path will serve the interests of OPEC. Gately (2004) and IMF (2005) analyse whether OPEC producers have the incentive to expand oil output and increase their market share as the IEA and DOE project. Rather than calculating the OPEC supply as a mere residual, Gately (2004) calculates OPEC’s NPV of profits for different choices of OPEC’s market share and for certain paths of non-OPEC supply. His main finding is that the NPV of the discounted profits is relatively insensitive to higher output growth. In fact, aggressive expansion plans to expand output can yield lower payoff than if OPEC decides to maintain its market share. This result is quite intuitive. Given certain assumptions about the model parameters, the increase in discounted expected profit from higher output would be more than offset by lower prices as a result of a rapid output expansion. Gately (2004) thus concludes that the projections made by DOE and IEA of rapid increases in OPEC output and rapid increase in market share for its current level are implausible and “are likely to be contrary to OPEC’s own best interests” (p.88). He notes that the incentive to increase capacity at a rapid pace might exist only under the assumptions of a high price elasticity of world oil demand and if non-OPEC supply is more responsive to high oil prices.¹⁶

4.2 Bottlenecks to Investment

Rather than a deliberate choice to limit production capacity, there might be serious barriers that prevent some OPEC countries from expanding their production capacity to levels anticipated by the various international organizations. The underlying framework for analysing investment in many of these projections is a frictionless model in which investment decisions are made in a world of no transaction costs, perfect information and no political constraints. The oil industry however is driven by its own logistics, the lags between planning investment and production, incomplete information and ambiguous signals, its capital intensity and political and historical developments. These factors and the interaction between them imply a very complex decision-making process which may often produce less than optimal investment decisions. The failure to take these frictions into account will not only misguide our understanding of past investment decisions which produced the current oil market structure, but will also affect our assessment of future patterns of investments in the oil sector.

¹⁶ In a separate paper, Gately (2001) reaches the same conclusion regarding Persian Gulf oil producers.

There is no scope in this paper to discuss the investment scene in MENA. However, it might be useful to make some general observations to emphasize some non-price factors that might prevent MENA exporters from increasing their capacity in the future. First, unfavourable geopolitical factors and sanctions can prevent capacity expansion in many oil-exporters through creating an adverse investment climate. In the past, economic sanctions hindered investment and deferred the development of projects in Libya, Iraq and Iran. In the near future, Iraqi production capacity is likely to be highly affected by geopolitical conditions and the security situation. Expectations that production would return to the pre-Kuwait invasion level once Saddam Hussein was overthrown proved to be highly optimistic. Projections that Iraq would be increasing its capacity, eventually replacing the dominant role of Saudi Arabia along with Russia, turned out to be premature. The security situation has taken its toll on the industry where looting and destruction, sabotage of pipelines, corruption and smuggling are likely to limit the export capability of Iraq. More importantly, the dynamics of Iraqi federal politics and uncertainties in the hydrocarbon laws are likely to undermine the incentive for foreign oil companies to invest. In this respect, it is doubtful that the Iraqi oil capacity will expand to such levels that it will alter the current market structure before a clear vision emerges about the future shape of Iraq – especially before there is settlement of the future status of Kirkuk and Southern Iraq where most oil fields reside.

In MENA countries where the state controls the hydrocarbon sector, the relationship between the government (the owner of the resource) and the national oil company (the operator) can result in low investment. Specifically, given the competing and increasing demands for economic, social and infrastructure projects, the budgets of national companies are likely to be limited, preventing them from undertaking investment, acquiring technological capabilities and enhancing their managerial expertise. This factor affects MENA exporters to varying degrees, with some national oil companies facing severe budgetary constraints preventing them from expanding to capacity.

Investment is also complicated by another relationship: between the governments and/or national oil companies and the international oil companies. International organizations such as the IEA consider that restriction of access to reserves is an important barrier to investment. However, access is not the central issue since such access is effectively restricted only in Saudi Arabia and Kuwait with the latter developing plans to open its sector to foreign investment through Project Kuwait. What matters most is the nature of the relationship between the two parties. Experience has shown that even in countries where access to reserves is allowed, there may be important obstacles that could delay or prevent investment by international oil companies. As markets have tightened and we transition again from a buyer's to a seller's market, the terms and conditions demanded by the owners have been hardening over time. This problem is likely to affect MENA countries to varying degrees with countries such as Iran being especially affected. Iran has very ambitious plans to increase its production capacity from the current level of around 4 mbd to more than 5 mbd by 2010 and 8 mbd by 2015. However, these levels of production cannot be achieved without attracting sufficient foreign investments and expertise. Iran has not been able to attract foreign investment on a large scale because of unattractive contractual terms. The Iranian constitution forbids granting petroleum rights on the basis of concessions or production sharing agreements. Instead, Iran has invented a type of service contract called the buyback contract in which the contractor

has to fund all exploration and development costs, and in case of discovery receives remuneration from the National Iranian Oil Company (NIOC). Once the contract is completed, the foreign oil company has to transfer the assets and operation of the field back the NIOC. Foreign oil companies find this type of contract unattractive for a number of reasons. First, the contract does not guarantee that the oil company would be permitted to develop its discovery or operate it. Second, buyback contracts usually do not allow foreign oil companies to build a long-term interest in the country. For the NIOC, the buyback system can also prove problematic, especially in an environment of low oil prices. By offering a fixed rate of return, the national oil company may be forced to sell more oil in order to meet the returns required.¹⁷ Because of these and other problems, Iran has been considering changing the buyback system although nothing substantial has been achieved on this front.

Finally, there is the issue of uncertainty in global demand for oil. Many OPEC officials consider that uncertainty about demand for oil constitutes a very important obstacle for investment. This has led OPEC members, with the leadership of Saudi Arabia, to call for security of demand in face of concerns about security of supply. OPEC has made this argument explicit where it argues that

“... if investors are unsure about the risks and the likely returns from petroleum investments they may not make those investments. If we do not invest enough money, or do it far enough in advance, then the world could face a shortage of oil supplies and a downward spiral in the global economy. However, if oil producers continue to receive reasonable prices and stable demand, they will maintain their production and invest far enough in advance to meet the growth of demand. Thus the security of oil supplies relies upon the security of oil demand. Oil producers – and oil consumers – need to work together to ensure that the security of oil supply and demand is preserved.”¹⁸

This argument of security of demand is highly impractical in the current market structure and the idea that uncertainty has to be resolved before making an investment is highly unrealistic. Investment decisions can only be made in the context of uncertainty. As suggested in the literature of irreversible investment under uncertainty (see for instance Dixit and Pindyck, 1994), because of the large investment outlays in oil projects and the irreversible nature of investment, the value of waiting increases. Investment is delayed until new information about market conditions arrives, especially information about expected global demand and oil supplies from other countries. For the oil industry, the option to wait is very valuable. After all, the decision to wait, not to invest and increase production is more profitable than to invest and increase production in the face of falling global demand. In other words, it is more profitable for OPEC to err on the side of under-investing in new capacity as opposed to expanding capacity as the decline in oil sales can be compensated for by the increase in oil price in tight market conditions.

4.3 Managing Capacity Expansions and Pricing Power

The above analysis suggests that there are serious bottlenecks that may prevent rapid capacity expansion. This is likely to have long-term implications for OPEC's pricing power. To understand why, consider a scenario in which there is rapid expansion in

¹⁷ EIA (2006), Country Analysis Briefs: Iran.

¹⁸ OPEC, “Is there any need for security of oil demand?” OPEC website, downloaded from <http://www.opec.org/library/FAQs/aboutOPEC/q19.htm>

capacity, for example the scenario in which Iraq re-emerges as a significant producer. If such a scenario takes pace, there is less incentive to reach agreements on production cuts because it is much more difficult for member countries to implement production cuts to levels well below their maximum sustained capacity. Under such circumstances, the incentive to cheat becomes high, especially for exporting countries with large revenue needs. On other hand, if capacity expansion fails to materialize and if demand continues to grow, then it is much easier to negotiate and reach agreements on the preferred utilization rates, as many of the member countries would be producing close to or at their maximum capacity. In this respect, geopolitical factors may have worked in OPEC's favour in the sense that the region has been hit by many conflicts that have prevented large expansions in capacity and reduced disagreement on the allocation of idle capacity. These events include, among others, the Iranian revolution, the outbreak of the Iran–Iraq war, US sanctions against Iran and Libya, the Iraqi invasion of Kuwait, the UN sanctions against Iraq and the invasion of Iraq (Libecap and Smith, 2004). This does not mean that OPEC no longer faces the problem of allocating idle capacity, but the problem is less acute when many member countries are producing close to their maximum capacity.

According to the above analysis, there is an unambiguous negative relationship between levels of excess capacity and the degree of collusion, and as such prices would be high during booms and low during recessions (see for instance Scherer, 1980; Philips, 1995). However, this view has been challenged by various studies that argue that excess capacity has two effects on collusion. On the one hand, it increases the incentive for firms to cheat and deviate from the agreement, while on the other, it implies a more severe punishment for the deviating firm (Brock and Scheinkman, 1985). According to this strand of the literature, the relationship between excess capacity and the degree of collusion is not unambiguous. However, as argued by Compte *et al.* (2002), these studies have focused on situations when all firms have the same maximum capacity. The authors show that the introduction of asymmetry makes collusion more problematic when excess capacity is high.

The failure to enhance capacity expansion creates problems of a different nature because even moderate shocks such as exogenous reduction in supply due to geopolitical or weather-related factors and/or healthy demand driven by a boom, can cause the core producers to lose their spare capacity. In these cases, they can no longer act as price makers. Thus, it is essential for core producers within OPEC to plan capacity expansion such that reasonable surplus capacity is always maintained. However, coordination on capacity expansions is very difficult, if not impossible, to achieve.

5. THE ROLE OF SAUDI ARABIA

Some observers anticipated that the re-emergence of Russia and Iraq as significant oil exporters would undermine Saudi Arabia's prominent role in the oil markets. These views, however, proved premature and there is little doubt nowadays that Saudi Arabia is likely to remain a prominent player within OPEC and in the oil market at least for the foreseeable future. Furthermore, Saudi Aramco, Saudi Arabia's national oil company, has been investing heavily in upstream oil with the aim of increasing the Kingdom's capacity from its current level of around 11 mbd to 12.5 mbd in 2009. In 2004, Saudi Arabia completed two mega projects, Qatif and Safah, with estimated gross production of 500,000 bd and 150,000 bd in 2004. In 2006, Saudi Aramco brought onstream its Haradah III crude oil project two months ahead of schedule. The project is expected to produce around 300,000 bd of Arab light crude at its peak. This expansion push is likely to continue for the next few years. Saudi Aramco is planning to bring onstream the AFK project in 2007 with an estimated gross production of 500,000 bd of Arab light. In 2008, the Shaybah (Phase 1) and Nuayyim fields are expected to come onstream with an estimated gross addition of 250,000 bd and 100,000 bd respectively. The largest increment of production is expected to come from the Khurais field, scheduled for completion in 2009. The gross addition from Khurais is estimated to reach massive 1.2 mbd.

According to Saudi Arabia's official oil policy, the reasons for embarking on such rapid expansion are twofold: to maintain a back-up capacity and to enhance the stability of the world oil market.¹⁹ Regarding the latter objective, it is important to note that stabilizing the world oil market (the fourth pillar of Saudi Arabia's oil policy) does not mean that Saudi Arabia prefers or wants low oil prices. In this respect, it is important to make a distinction between price takers and price makers within OPEC. The price taker is a small producer with little influence on price while the latter has market power and can influence the price by individual actions. As argued by Mabro (2003), the role of the price maker is

“... to set the price not to express, in an unconstrained manner, views about its level. The view he is obliged to take will have much to do with what can be achieved, not with what one can dream about in an idealized world divorced from reality. We have, therefore, on the one hand the price-takers, who have the freedom to dream and no power to act, and the price-maker who has the unenviable task to bring the dream within the confines of real economic and political conditions. The feasible price, in most circumstances, is likely to be lower than the one price-takers talk about and would like to have. In these situations the price-maker will always appear to be a moderate. This does not necessarily characterise his 'ideal preferences'... it does certainly not mean that low prices are an objective of policy.”

The aim of maintaining back up capacity is to preserve Saudi Arabia's leadership in international oil markets. This leadership depends on managing and maintaining

¹⁹ Saudi Arabia's official oil policy as outlined by Ali Naimi, the Saudi Oil Minister, is based on the following five pillars: “The first is a high level of oil and gas reserves... Second is daily oil production... The third is our back-up capacity... Fourth is our regard for stability of the world oil market... Fifth and finally, Saudi Arabia has followed a policy of acquiring and developing technology to advance its expertise.”

excess capacity without which it ceases to become a price maker. A widely held view in the literature is that Saudi Arabia has assumed the role of a swing producer in many occasions. Because of its excess capacity, Saudi Arabia can swing its production depending on the residual demand it faces which in turn depends on global demand for oil and the supply of the fringe producers. In fact, Libecap and Smith (2004) consider that it is this special role of Saudi Arabia that has kept OPEC afloat all these years. To provide support for their hypothesis, they examine the frequency of countervailing adjustments i.e. output adjustment in the opposite direction to the fringe producers. Their basic hypothesis is that if the supply behaviour of the fringe is erratic, then Saudi Arabia production would also be erratic but in the opposite direction. They find that the countervailing adjustment is higher than one would expect from a cohesive and disciplined cartel.²⁰

Others have argued that by using its excess capacity, Saudi Arabia has played the role of a discipliner who, from time to time, punishes members exceeding their quotas by flooding the oil market and reducing the price (Griffen and Neilson, 1994; Soligo and Jaffe, 2006). For instance, Griffen and Neilson (1994) find evidence that Saudi opted for a tit-for-tat strategy that punishes some members and rewards others. Specifically, as long as Saudi Arabia earns more than Cournot profits, it will be willing to tolerate deviations. However, if cheating goes too far, the swing producer will punish the cheaters by increasing its production until everybody gets Cournot profits. The adherents of this view refer to two examples from recent years: in 1985 when Saudi Arabia boosted its supply in an attempt to increase market share and in 1998 when Venezuela embarked on a policy of increasing production and rapid capacity expansion. In both cases, it is argued that Saudi Arabia played the role of discipliner, important to maintain the cohesiveness of OPEC especially in the absence of a formal disciplinary mechanism within the organization.

Despite this prevailing view in the literature, the evidence has not been very supportive for the swing producer role. For instance, Smith (2005) finds inconclusive evidence and concludes that “if the Kingdom has assumed the role of Stackelberg leader, dominant firm, or swing producer, it must not have been pursued with enough vigour and continuity, either before or after the quota system was adopted to have left discernable pattern in the data”. Mabro (1998,b) also argues that against all expectations, Saudi Arabia has been performing the role of a fixed volume supplier that does not vary output according to changes in oil demand, noting that from 1992 to the first half of 1997 the Kingdom maintained an almost fixed production of 8 mbd. This suggests that further research is needed to understand the role of Saudi Arabia.

Regardless of the nature of its role, given the Kingdom’s dominant position in reserves, production and excess capacity, Saudi Arabia’s actions are bound to influence oil prices. However, it is important to stress the following points. First, in a slack market, Saudi Arabia could be left with a huge surplus capacity, a situation which it tries to avoid but cannot escape if concerned about the price level. Second, although the target set by Saudi Arabia could be achieved, the planned spare capacity of 2 mbd is very thin for a system as big and complex as the world petroleum system. In any case, the rise in capacity may be absorbed by rising demand and falling supply outside Saudi Arabia. Thus, unexpected events can cause an erosion of excess

²⁰ Of course, there would be occasions in which the output adjustment moves in the same direction: for example, if there is an increase in global demand for oil or if Saudi Arabia feels that residual demand has fallen to very low levels and decides to embark on a policy of increasing market share.

capacity in which case Saudi Arabia will cease to act as a price maker. Third, the notion that Saudi Arabia will always have the incentive to maintain spare capacity should be critically examined. Recently, Saudi Arabia has been raising the issue of whether it should bear on its own the costs of maintaining spare capacity. It is obvious that the 'international oil order' where non-OPEC supplies much of the incremental global oil demand and Saudi Arabia provides the capacity cushion may no longer be viable in the future.

6. CONCLUSION

Although there is plenty of room for OPEC to influence the oil price in the current oil pricing system, this influence is not unconstrained. In this paper, we have argued that the recent changes in the international oil pricing system have diminished OPEC pricing power, especially when compared to the previous administered oil pricing system. We have also emphasized that OPEC pricing power is not constant and varies according to oil market conditions. Finally, we question the proposition that OPEC in general and the Middle East in particular are bound to have a greater influence on the oil market as they develop their reserves and gain a greater share of the market.

Although the paper's focus has been on economic factors, it is important to stress that OPEC does not operate in a political vacuum. It has been argued elsewhere that pricing systems in the past reflected the balance of power at those times and this present system is no exception (Fattouh, 2006a). For many, the balance of political power can have an impact on OPEC behaviour. For instance, Doran (1980) hypothesizes that there are limits on how much Saudi Arabia can increase its oil price because very high oil prices can be "damaging to their own interest because of the danger to the world economy and to their larger commercial involvements and because of the incentive to outside military pressure by distraught consumer governments" (p.91). He also argues that 'political and cultural similarity' has facilitated Saudi Arabia's role in forming coalitions regarding price preferences. Others have attributed important episodes in oil history to political factors. For instance, some argue that the decline in oil prices in 1986 might have been orchestrated between Saudi Arabia and the USA to undermine the financial position of the USSR.

There is no harm in incorporating some (but not all) of these ideas into the analysis of OPEC pricing power. However, it is important to stress that the impacts of such political factors are not independent of the oil market. For instance, the oil price rise in 1973 would not have occurred in slack market conditions and the collapse of oil prices in 1986 would not have happened in tight oil market conditions. Similarly, the oil price shock in 1990, owing to the Iraqi Invasion of Kuwait, would have had a much bigger impact if it had occurred in the tight market conditions of 2004. Similarly, imposing oil embargoes is more feasible when oil prices are low and markets are well supplied. These and other examples suggest that although oil is a political commodity, it is still a commodity and like any other, in the long run its price responds largely to economic forces.

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