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Financial market pressure, tacit collusion and oil price formation ☆

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ABSTRACT

We explore a hypothesis that a change in investment behaviour among international oil companies (IOC) towards the end of the 1990s had long-lived effects on OPEC strategies, and on oil price formation. Coordinated investment constraints were imposed on the IOCs through financial market pressures for improved short-term profitability in the wake of the Asian economic crisis. A partial equilibrium model for the global oil market is applied to compare the effects of these tacitly collusive capital constraints on oil supply with an alternative characterised by industrial stability. Our results suggest that even temporary economic and financial shocks may have a long-term impact on oil price formation.

1. Introduction

Ever since the oil price shocks of the early 1970s, the Organization of the Petroleum Exporting Countries (OPEC) has been followed with massive interest from the public, reflecting the vital significance of the oil price to industry, households and financial markets. The special structure of the oil market has also attracted scholarly interest, with numerous studies of OPEC's role and strategy in various models of producer behaviour under imperfect competition (e.g., Smith, 2005; Fattouh, 2007). Less attention has been given to the role of producer behaviour in non-OPEC countries. Nevertheless, investment behaviour in the international oil and gas industry is an important part of supply-side dynamics in the oil market, and therefore also an important factor behind the formation of oil prices.

Our key hypothesis is that a strategic redirection of the international oil industry towards the end of the 1990s has had long-lived effects on OPEC strategies — and on oil price formation. Starting in 1998, increased focus on shareholder returns, capital discipline and return on capital employed (RoACE)[1] caused a slowdown in investment rates and production growth among international oil companies (Antill and Arnott 2002; Osmundsen et al. 2006). Strong growth in oil demand and consolidation in the competitive fringe allowed OPEC to raise their price ambitions significantly at the turn of the century (Haskel and Scaramozzino, 1997; Kohl, 2002). The objective of this study is to quantify the oil price impact of these developments. Using a detailed simulation model for the global oil market, we examine the effects of the change in investment pattern on oil supply and oil prices, as compared with a situation characterised by industrial stability and unchanged price ambitions within OPEC.

Oil demand is quite inelastic to oil price changes, and tightly linked to GDP growth.[2] As noted by Lynch (2002), the dissection of crude oil supply is less straightforward, with geology, geopolitics, and imperfect competition as important complicating factors. At the same time, the degree of concentration among the most important oil producers is significant, leaving a potential scope for pricing power (Fattouh, 2007). Total oil supply is comprised by production from two groups of players. One is the group of OPEC countries, with national oil companies situated in the most resource-rich regions of the world (Noguera and Pecchenino, 2007). The other is often referred to as non-OPEC, strongly influenced by the group of international oil companies (IOCs). Most of

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[1] RoACE is defined as net income adjusted for minority interests and net financial items (after tax) as a percentage ratio of average capital employed, where capital employed is the sum of shareholders' funds and net interest-bearing debt.

[2] The macroeconomic role of the oil price has intrigued macroeconomic researchers for decades (Barsky and Kilian, 2004). Empirical studies suggest that oil price changes above some threshold level will have contractionary effects on global economic activity (e.g., Jiménez-Rodriguez and Sánchez 2004; Jones et al., 2004; IMF, 2005). Distributional effects are also involved, as the rewards of an increase in the oil price are reaped by oil-exporting nations, whereas the costs tend to be carried by less wealthy oil-dependent countries (e.g., Gately and Huntington, 2002; World Bank, 2005).

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these companies have their origin in the western hemisphere, they have private shareholders, and their shares are traded on stock exchanges in London and New York.

Osmundsen et al. (2007) argue that changes in the interaction between listed oil companies and their shareholders have suppressed investment behaviour and production growth among these companies from 1998 and onwards. We present a more comprehensive assessment of the oil market impact of changes in IOC investment behaviour. Our modelling approach allows an empirical assessment of supply side dynamics following the change in investment policies in the oil industry after the Asian economic crisis. The model simulations clearly suggest that enhanced capital discipline caused a temporary slowdown in investment and production growth among international oil companies. Consequently, global exploration activities, investment expenditures and oil production growth were suppressed, allowing OPEC to raise their price ambitions. Specifically, we find that the curb on IOC investments around the turn of the century caused an increase in the oil price of around 10% in the long run. Both OPEC and non-OPEC producers gain from this development, whereas the cost is carried by oil-importers and consumers.

The paper is organised as follows. Section 2 provides a review of previous research of OPEC behaviour and oil industry dynamics, as well as a discussion of the rationale for our hypotheses about supply side behaviour. In Section 3, we introduce the FRISBEE model, and discuss two different scenarios for the oil market — to isolate the effects on exploration activities, investments, oil production growth and price formation. Concluding remarks and directions for future research are presented in Section 4.

2. Financial market pressures and OPEC behaviour

The last serious oil demand shock was experienced in 1998–1999, when the Asian economic crisis reduced anticipated demand growth rates by some 2 percentage points (EIA, 2006). One result was a change in investment behaviour among the IOCs. At the same time, the Asian economic crisis had the effect of pulling the OPEC countries together. OPEC regained market power and oil price ambitions were raised. We explore the behavioural changes of OPEC and the IOCs in greater detail below.

2.1. Tacit collusion in IOC investment

In the late 1990s, both the oil market and the financial market turned against the oil and gas industry. First, the "New Economy" euphoria made investors shift their investments from oil and gas to IT stocks. Oil and gas companies were generally perceived as old-fashioned and inefficient, with limited exposure to the exuberance of the IT sector.[3] Second, the Asian economic crisis caused a sharp slowdown in global oil demand. In 1998 the oil price touched record lows of 10 USD/bbl., increasing the uncertainty and anxiety also with respect to oil price expectations. The result was not only a severe pressure on current oil company cash flows, but also an increasing scepticism with respect to future earnings. In consequence, oil and gas companies failed to deliver competitive returns to their shareholders, as illustrated in Fig. 1.

Usually, investments and production growth declines at falling oil prices. However, Fig. 3 indicates that after the year 2000 production growth is declining even at increasing oil prices. This clearly illustrates a change of IOC policy — investments were curbed to improve RoACE. The IOCs were responding to the sentiment in the financial community at that time.

Ideally, valuation should be undertaken by means of net present value analyses. The value of a firm is then determined by the cash flow,

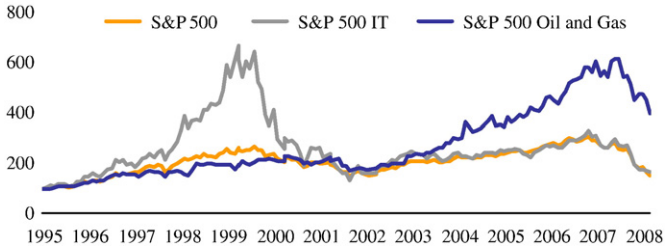

Fig. 1. Total return to shareholders 1995–2008 (1995 = 100).
Source: ReutersEcoWin.

growth and risk characteristics (see Antill and Arnott (2000) for a more comprehensive analysis). As analysts lack the necessary data and other resources to do such analyses in a proper manner (asymmetric information). According to Damodaran (2002), the use of relative valuation is widespread. The reasons are that valuation based on multiples can be completed with far fewer explicit assumptions and far more quickly than an exhaustive discounted cash flow (DCF) valuation. Furthermore, relative valuation is simpler to understand and easier to present to clients. A crucial issue for valuation analyses is to determine key indicators that may cause valuation multiples to vary across firms in the same sector. For the international oil and gas industry, one of the most common financial indicators and valuation benchmarks are Return on Average Capital Employed. Such indicators can be perceived as a simplified implicit incentive scheme presented to the companies by the financial market.[4]

Around the turn of the century, a widespread practice among analysts and investment banks was to link valuation to the companies' RoACE figures. For a given year, UBS Warburg (2003) claim to identify a clear relationship between RoACE and the EV/DACF multiple,[5] and conclude:

> "Each of the stocks which we rate a 'Buy' is trading below the average level relative to its returns. EV/DACF versus RoACE provides the key objective input into the process of setting our target prices."

Similar statements about valuation, multiples and return on capital are made in Deutsche Bank's publication Major Oils. Accordingly, Return on Average Capital Employed was significant in valuation oil companies (cf. Fig. 3 below). As a consequence of this variant of yardstick competition (Schleifer, 1985), the IOCs – trying to maximise their stock price – set very ambitious RoACE-targets. Table 1 outlines profitability and growth targets for 10 international integrated oil and gas companies, as presented to the capital market in 2003.[6]

To obtain high RoACE-figures, investments had to be curbed, and oil companies needed to increase the return of their individual projects. For new projects this implied a raise in the internal rate of return requirements (IRR).[7] Surveys of the rate of return requirements in the

[3] In other words, demand for oil stocks was brought down to ensure a return commensurate with risk given the market environment at the time.

[4] Observe that Return on Average Capital Employed has its flaws. Due to accounting procedures in the petroleum industry, the indicator does not give a good view of the underlying profitability of projects, since assets are depreciated too quickly. Due to heavy investments and front end loading, Return on Average Capital Employed will fall in the first years of a typical project cycle. Later in the project cycle, when investments fall and the capital asset depreciates, Return on Average Capital Employed will rise. The focus on Return on Average Capital Employed will therefore favour management attention on long-lived legacy assets of the oil and gas companies. Further, Return on Average Capital Employed will be boosted in periods of divestment. The implication is that inertia is rewarded (Osmundsen et al., 2007). The problem of suboptimal investments due to financial indicators is related to other capital markets distortions due to asymmetric information (e.g., Harris and Raviv, 1991).

[5] EV/DACF is a cash flow multiple used for valuation of companies; the relation between enterprise value (EV) and debt-adjusted cash flow (DACF). For a discussion of financial metrics and valuation multiples, see Damodaran (2002).

[6] All companies except ExxonMobil and BP communicate explicit short-term profitability targets in terms of RoACE. All companies except ChevronTexaco are held accountable against explicit targets for total oil and gas production growth.

[7] For a discussion of the relation between RoACE and IRR, see Aven et al. (2005).