

OIL COMPANY CRISIS

Managing Structure, Profitability, and Growth

NICK ANTILL
AND ROBERT ARNOTT



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CONTENTS

List of Figures	v
Acknowledgements	vi
1 INTRODUCTION	1
2 INDUSTRY STRUCTURE	3
2.1 An Examination of Corporate Structure	3
2.2 The Urge to Integrate	4
2.3 A Question of Balance	6
2.4 Just how Operationally Integrated?	9
2.5 Are there Tangible Benefits to Operational Integration?	10
2.6 Important Transition to Financial Vertical Integration	12
2.7 Integration or Atomisation?	14
2.8 Market Inefficiencies that Favour Integration	15
2.9 Firm Specific Arguments in Favour of Integration	24
2.10 Should Companies or Equity Markets Diversify?	31
2.11 Business Segment Response to Market and Firm Specific Risks and Challenges	40
2.12 Core capabilities	49
3 A QUESTION OF PROFITABILITY	52
3.1 Not as Simple as it Looks	52
3.2 What is the Problem?	52
3.3 How did we Get Here?	56
3.4 Measuring Profitability	59
3.5 Growth and ROCE	63
3.6 Conclusion regarding Appropriate Responses	65
3.7 Our Application of Economic Profit	67
3.8 What Does it Mean?	73
3.9 Our Findings	74
3.10 Implications for the Companies	76

4	CONCLUSIONS	78
5	BIBLIOGRAPHY	80

LIST OF FIGURES

Figure 1:	Imbalances in the Integration of the Major Private Oil Companies	9
Figure 2:	Capital Rotation 1990 to 2001	17
Figure 3:	Highly Taxed EP Operations fail to show up in Corporate Tax Rates	20
Figure 4:	The Cost of Capital Falls as Market Capitalisation Increases	36
Figure 5:	2003 Price Earnings Multiples for the Sub-sectors of the Oil and Gas Sector	37
Figure 6:	2003 EV/EBITDA Multiples for the Sub-sectors of the Oil and Gas Sector	37
Figure 7:	2003 Price Cash Flow Multiples for the Sub-sectors of the Oil and Gas Sector	38
Figure 8:	Profitability of the Oil Sector 1991 to 2001	39
Figure 9:	The Contrasting Scale of Upstream Operations in 2001	40
Figure 10:	Finding and Development Costs Fall with Size and Diversity	42
Figure 11:	Risked Future Capital versus Weighted Average IRR for Various Projects	44
Figure 12:	Accounting and Economic Returns Differ	61
Figure 13:	The Growth versus Return Trade-off	64
Figure 14:	CFROI Performance Model	66
Figure 15:	Aggregate Returns for the Super Majors	75

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1. INTRODUCTION

After a long period of cost cutting, the oil companies were left with little choice but to embark on a wave of mergers to rekindle growth aspirations. If these efforts founder, what should the oil companies do next? Should they accept fashionable arguments in favour of deconstruction and break up into focused entities, and would this actually add value? We believe not, but this raises additional questions. How should they address the trade-off between reinvestment in growth and maintenance of returns on capital employed? How should they measure the latter, and what does the capital market really expect of them? We believe that target returns on capital are far too high and current accounting returns on capital are largely delusive. This also has implications for capital allocation since the upstream is a lot less profitable than it looks, though still much more profitable than refining.

1.1 Integration or Atomisation?

It is becoming fashionable to question the vertically integrated structure of the super majors (as BP, ChevronTexaco, Exxon-Mobil, Royal Dutch Shell and TotalFinaElf are now generally known), and to argue that value would be unlocked if they were to be reconstituted as independently focused entities. This sits uncomfortably, but contemporaneously, with an equally debatable claim that as the gas and power markets of the USA and Europe are liberalising, they should take the opportunity to create vertically integrated chains into these industries, mirroring the structures that now exist in the oil part of their businesses.

Although it has been argued that focused companies should outperform unfocused companies, claims like these ignore all sorts of other inefficiencies that occur in the capital markets, in political barriers or regulation, or in relationships with suppliers, customers and staff. If companies are really just a bundle of contractual relationships then it is important to analyse the impact of corporate structure on all of them – not just the ones that are currently internal and might be externalised, but those that are

already external as well. Such analysis leads us to the conclusion that there is still a compelling case to be made for operational integration in immature markets and financial integration in mature markets. However, a challenge still remains as to how companies can build on the core competencies that result from integration in order to deliver even higher shareholder value.

1.2 A Question of Profitability?

Oil companies also need to recognise the fact that they operate in an industry that is capital intensive with long asset lives. As a result published accounts are a fairly worthless measure of profitability and they do not accurately reflect the underlying value of the asset base. Internal rates of return based on more realistic assessments of underlying asset values are, as would be expected, close to the cost of capital.

Individual companies will have comparative advantages in certain parts of the business, which they should seek to exploit. However, identifying them requires much more sophisticated benchmarking than most of them now undertake. There is also a secondary, but equally important, requirement of getting the message across to the providers of capital. An accurate and transparent internal methodology would also provide the framework for efficient communication with providers of capital.

2. INDUSTRY STRUCTURE

2.1 An Examination of Corporate Structure

Over the past ten years the drive by the private oil companies to improve short-term profitability has resulted in exhaustive cost cutting to the extent that growth has been curtailed. Growth is now on the agenda again for most of the private oil companies, and they have all started to examine new ways of adding value. In particular, there is a shift towards the examination of corporate structures. It is becoming fashionable for commentators on the industry to question the vertically integrated structure of the super majors, and to argue that value would be unlocked if they were to be reconstituted as independently focused entities. At the same time there is an equally debateable claim that as the gas and power markets of the USA and Europe are liberalising, they should take the opportunity to create vertically integrated chains into these industries, mirroring the structures that now exist – but that the same commentators are busily decrying – in the oil part of their businesses.

In this section, we examine the arguments for and against integration in some detail by looking at the history of this branch of industrial economics in which it has been argued that focused companies should outperform unfocused ones unless there are transaction costs or threats of ex-post opportunism to justify the vertical chain. It is also argued that justification for vertical integration diminishes in more mature industries, such as the oil industry.

But claims like these are, probably, excessively academic, and they ignore all sorts of other inefficiencies that occur in the capital markets, in political barriers or regulation, or in relationships with suppliers, customers and staff. It is therefore very important to examine the impact of corporate structure on all types of contractual relationships, both internal and external.

In this section we also discuss the structure of the Russian companies whose background is very different. They only emerged as integrated corporate entities during the 1990s, and

they did so as a part of the emergence of liberal capitalism in Russia. What is surprising is the extent to which they already have to address the same issues as their western competitors.

2.2 The Urge to Integrate

In the purest sense of the definition, vertical integration defines either backward or forward integration into adjacent activities in the value system. Backward integration refers to development into activities that are concerned with inputs into the companies' current business. In the oil business, the production of oil and gas are important inputs into a refining company's business. The acquisition of oil and gas producing assets by a refiner would therefore be defined as a related diversification through backward integration. Forward integration refers to development into activities that are concerned with a company's outputs. Therefore a refining company would be said to be diversifying through forward integration if it were to acquire a marketing company for its products. Vertical integration can aim at full operational integration where it participates in all parts of the value chain or partial operational integration where it only builds positions in selected stages of the industry's total value chain.

Vertical integration should not be confused with horizontal integration, or movements towards greater oligopoly or monopoly within an industry. However, vertical integration may encourage tendencies toward oligopoly by offering the integrated companies a competitive edge against their less integrated rivals.

2.2.1 The usual arguments in favour of integration

In the oil and gas industry, the private companies often cite a number of advantages to vertical operational integration to justify their existing structure. These advantages include the control of supplies, the control of markets, access to information, cost savings, spread of risk, building on core competencies and technology, parenting and resource utilisation. The control of supplies might be justified in order to ensure a security of continuous supply of crude to refineries or product to market outlets, which in turn will lead to a more efficient operation. The drive by private oil companies to increase their marketing

outlets may have been due to a need to gain guaranteed distribution, which in turn could lead to a steadier and more efficient planning of output.

It has been argued that vertical integration increases a company's ability to gain access to information across the full value chain making it easier to assess both internal and external opportunities. A fully integrated chain might also give rise to greater opportunities for cost saving and may enable a company to optimise capacity in all areas of its operations.

However, one good reason to justify vertical integration is to strengthen the firm's competitive position. Indeed it is for this reason that the oil and gas industry has historically had the urge to integrate. The early development of the industry almost always took the form of certain firms trying to gain an advantage over others by obtaining some sort of monopolistic position in a key part of the oil or gas value chain. For example, in Rockefeller's days in the USA, there were a large number of potential suppliers of crude oil into the refining and marketing business. Rockefeller's creation was a vice-like lock on the US refining and marketing industry as the potential existed to extract an economic rent at that point in the value chain. Outside the USA, supply costs and logistics were a major factor in the industry integration. In Russia, producers had to develop and invest in transport technologies to get the oil to market. Royal Dutch had to seek downstream outlets to get its Indonesian oil to market and found a partner in Shell who had pioneered the use of bulk tankers and storage. As a result of these early strategic actions, there was often very little debate as to whether vertical integration of the oil and gas industry was an efficient way of organising the firm. In fact, vertical integration almost became a competitive necessity for the major firms, with its existence providing its own justification.

Since the oil and gas industry has historically been driven towards operational vertical integration, it has always been argued by companies that this is the most appropriate business model. However, the imperfections of the market, a degree of monopoly and legal arrangements surrounding the production of crude have historically led to a degree of profitability that might not necessarily have equated with the most efficient use of resources in the value chain. Over the past ten years, the erosion

of the value of imperfections in the market as a result of a fully developed oil and product market, increasing regulation and the erosion of upstream margins have all put pressure on profitability. As a result the business model of operational vertical integration has been challenged.

2.3 A Question of Balance

Clearly in a world where all vertically integrated companies were in total operational balance there would be no market for crude oil and competition could only take place in the final sale of products or in the purchase of rights to exploit the resource base. In addition, if integrated firms were completely in balance with respect to their requirements for crude oil (producing all the crude they use and selling none outside) and their requirements for products (refining all the products they sell and selling none through other firms), their output would be related only to the demand for their products in markets served by their own distribution network.

2.3.1 Operational integration until the 1970s

Until the 1970s, most of the private oil companies were operationally vertically integrated. In addition to providing very significant barriers to entry, thereby restricting competition, this also enabled price discrimination, whereby companies could vertically integrate into the demand elastic (low-price) market to prevent resale into the inelastic (high-price) market. This process was self-feeding as widespread operational vertical integration meant very limited arm's-length offering. This made the crude oil market very small and inefficient, generating high transaction costs if the market was used. In turn this gave ever-greater logic to being vertically operational, further reducing arm's-length offering, reducing market size and efficiency and increasing transaction costs.

This situation was altered when the upstream assets of many of the private oil companies were nationalised in the early 1970s. Initially this did not cause major changes to the crude oil market since the private oil companies retained the preferential right to market the crude oil produced in the former concessions.

However, once these long-term crude contracts were broken at the end of the 1970s in the second oil shock, operational vertical integration began to disappear. As a consequence, more arm's-length offerings by producing governments increased the volume of transactions in the market and with it market efficiency. As market-transaction costs fell, private oil companies began to move voluntarily away from operational vertical integration, thereby increasing market volumes. By the 1990s, only a few of the private oil company operations could be described as being operationally vertically integrated. In fact, even those private oil companies, whose refining capacity equalled oil production capacity, could not claim to be operationally integrated as most of their transactions for the purchase and sale of crude oil and products were not completed internally but externally, through the oil and product markets.

2.3.2 The Russian oil industry exception

The structure of the Russian oil industry has changed dramatically over the past ten years. In fact, during the last decade it has moved from being a state-owned industry to being almost fully privatised whilst also having to grapple with new structural organisations. At the beginning of the 1990s the petroleum industry in Russia was owned by three separate ministries. The Ministry of Geology controlled exploration, the Ministry of Oil and Gas controlled the production associates and crude pipelines and the Ministry of Petrochemicals and Refining refineries and product pipelines. In effect, the industry was not integrated and there was little or no financial link between each entity.

With the formation of the new Russian Federation, the oil and gas industry was put under the control of the new Ministry of Fuel and Energy with the aim of creating vertically integrated oil and gas companies in order to eliminate operational inefficiencies. However, tensions between the many individual production associations, refineries, pipeline companies meant that the process of integration did not start to take off until the privatisation process began. For example, Yukos was a creation from five production associates and five refining companies. Lukoil was created from four production associates and seven refining companies. The consolidation of the industry has continued

but most Russian private oil companies are still structurally short of refining capacity.

The operational imbalance is clearly still a concern to these companies and, as a result, they have embarked on a significant programme of investment in domestic refining capacity totalling several billion dollars in order to redress the imbalance. The importance here is that the lack of a liquid domestic spot market for crude has forced the domestic industry to secure its own outlets in order to try and extract a higher economic rent from the product market place. More recently the Russian industry has considered international downstream acquisitions, again with the aim of correcting the operational imbalance. Lukoil, for example, has acquired refineries in Romania, Bulgaria and the Ukraine. However, with a move from immature to mature product markets in Western Europe the Russian companies will face stiff competition and they will of course lose any benefit they might have from operational integration in their domestic market.

2.3.3 The development of a mature oil market has important consequences

The development of a mature crude oil market by the late 1990s reduced the need for private oil companies to be involved in all parts of the energy chain. As a result there has been no pressure in the oil chain for companies to strive to be balanced. Increasing liquidity in the crude and product markets has meant that the benefits of being vertically integrated have been eroded. Internal transfer prices based upon market prices have shifted the industry towards a greater focus on costs within each part of the value chain, as it is no longer possible to artificially boost profitability by controlling the price. The growth of the futures market has also enabled companies to hedge against extremely volatile prices in order to protect cash flows.

Today, all of the private integrated companies are out of operational balance, with most having to acquire nearly all of their crude oil or products from the market, whereas others are forced to sell surpluses. However, it is very difficult to gain any empirical data that substantiate the argument that such imbalances can lead to inefficiencies. This is because integrated

companies might simply have inefficient operations whilst non-integrated companies might actually benefit from specific market inefficiencies. The samples are not big enough to make cohort analysis persuasive.

2.4 Just how Operationally Integrated?

The operational imbalance of the private oil companies is highlighted in Figure 1. In this figure, the imbalance index is defined as the difference between the total oil production of a company and its total refinery runs divided by whatever figure is largest. With this definition, a positive value indicates a company that produces more crude oil than it refines, while a negative value indicates a company that refines more crude than it produces. For all positive values, the denominator is production whereas for all negative values the denominator is refinery runs. The index thus has a maximum value of 100 for a company that only produces crude, and has no refinery activity; a minimum value of -100 for a company that only refines, and produces no crude; and values of close to 0 for companies that are vertically balanced, meaning they refine about as much as they produce.

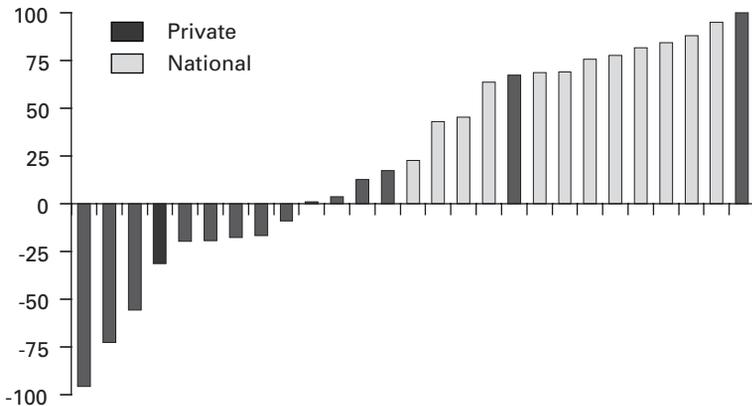


Figure 1: Imbalances in the Integration of the Major Private Oil Companies (2001)

Source: PIW December 2001

2.4.1 Private oil companies reducing refining capacity

Figure 1 utilises the 2001 data of the most important oil companies as ranked by Petroleum Intelligence Weekly. It highlights the fact that most of the national oil companies (NOCs) are still heavily weighted towards production (positive numbers) whereas the private oil companies are still weighted towards refining capacity (negative numbers). Over the past ten years there has been some convergence between the two groups, with the private oil companies reducing their refining capacity in contrast to the major NOCs who are still trying to increase their presence downstream. However, the motives behind the changes are different for the two groups.

For the private oil companies, the motive behind the reduction in refining capacity has mainly to do with trying to improve financial performance in a sector that has suffered from overcapacity and increased demand for products with superior environmental qualities, all of which requires significant investment. In this respect, companies such as BP and Royal Dutch Shell have moved to a position of operation balance whereas ExxonMobil still has more refining capacity than production.

For the NOCs the drive to integrate vertically downstream has more to do with establishing a secure outlet for crude oil production. Many of the newly formed Russian private oil companies who are long on production (e.g. Lukoil) are considering similar moves into the downstream for exactly the same reason as the NOCs. In the near term, it is difficult to see these operational imbalances changing significantly. Simply put, most private oil companies realise that whilst OPEC is in effective control of the crude oil market, the greatest returns in the oil business are to be gained from developing new oil fields and not from investing in refining. In contrast, the focus on maintaining or even increasing production capacity means that for the NOCs there is simply no finance available to adopt a more aggressive downstream policy.

2.5 Are there Tangible Benefits to Operational Integration?

Having examined the current state of vertical integration in

the oil industry it is important to try to assess whether those companies that are more integrated benefit financially. Vertical integration is an integral part of economic theory and especially industrial economics. The study of the subject has been approached from three directions: the theory of the firm, the theory of markets and, more recently, contract theory. Early studies on vertical integration were largely based on applied price theory, which considered it to be a mechanism that allowed firms to circumvent taxes on intermediate goods and exert monopoly power and price controls. However, price theory and its implications were somewhat modified by the proponents of the transactions costs approach. This approach argues that it makes sense for a firm to vertically integrate if it expects to gain from replacing market transactions by internal coordination.

2.5.1 Little quantitative work on the benefits of integration in the oil industry

Although there has been much qualitative work on the state of integration in the oil and gas industry very little quantitative work has been carried out. There is also confusion over what exactly to measure. Within the oil industry, integration and size tend to be closely associated and a common belief exists that there is a correlation between vertical integration, size and performance. If this were to be the case then we would expect to find an industry populated only by fully integrated very large companies. In fact, what we find is an industry showing a large dispersion in the segments in which the companies operate. In addition, the industry rarely exhibits specific trends in the degree of integration over time.

The most detailed quantitative work on the benefits of integration has historically been focused on a cost-benefit analysis, which allows the advantages and disadvantages of vertical integration to be quantified. These studies show that companies engaged solely in the exploration and production (E and P) business are less efficient than companies engaged in both refining and E and P operations, and that those companies with the highest level of debt are the least efficient. However, the role of integration among all other stages has not been positively quantified. Indeed, the cost of relying on market transactions is now so negligible

that the results of most cost benefit studies are statistically meaningless. The most important conclusion suggests that the decision to integrate in the oil chain can no longer be justified using quantitative analysis and that the decision to remain operationally integrated or to integrate further must be firm specific. Such analysis has led certain commentators to argue that 'if international integrated oil companies did not already exist, there would be no reason to create new ones' (Bleakley et al, 1997, p.1).

The quantitative studies have however thrown up some interesting conclusions with regards to overall company performance. Such analysis shows that competition has a positive effect on integrated company performance whereas market power seems to reduce company efficiency probably due to slack and complacency associated with a monopoly. Not surprisingly 'competition by comparison' with other companies in the industry leads firms to improve their performance when they deviate from the industry norm.

2.6 Important Transition to Financial Vertical Integration

Although the oil industry today is no longer operationally integrated it can be described as being vertically integrated financially. Financial vertical integration is when a company owns or controls the cash flow in different stages of the industry. Clearly, vertical financial integration is a prerequisite if operational vertical integration is to be present. However, operational vertical integration is not an automatic consequence of financial vertical integration. Hence, the E and P division of a major can sell into the crude oil market, the refining division can buy from the product market, and the marketing division can also buy from the product market. In essence the private oil companies are operating like diversified industrial conglomerates.

2.6.1 New focus on business segment profitability

The importance of the transformation of the industry from being operationally integrated to being financially integrated cannot be overstated, especially as the transformation coincided with the

industry becoming a price-taker rather than a price-setter. Most importantly it meant that the private oil industry was liberated from pursuing a strategy of operational balance, shifting instead towards profit maximisation. In effect, private oil companies had to provide a return to shareholders at least on a par with other companies in the same sector and if for any reason this could not be achieved, the company should return money to its shareholders.

The consequence of this was for each private oil company to view each business segment as its own line of business, which must justify itself on its own financial returns. For the first time, private oil companies started to publish financial data relating to each discrete business segment. Operationally, companies began to restructure themselves internally into numerous distinct business units. In the case of BP, there are over 150 separate business units each with separate financial and operational targets all reporting to senior management. In effect, the private oil companies have begun to resemble equity portfolios with senior management playing the role of a fund manager, selling off unprofitable units and buying in or investing more in profitable units in order to maximise the overall value of the 'fund'.

With the private oil industry effectively becoming a price-taker, management is effectively left with only two actions to improve bottom line earnings growth, reduction of costs and growth in revenues. Of these two actions, the key to profit maximisation over the past ten years has been cost cutting. The human cost of the reduction in costs has been dramatic with the industry losing nearly 30 per cent of its staff since 1990. Although the cost cutting of the past decade might have improved near-term profitability, it did strip many of the private oil companies of longer-term growth options leaving them with little choice but to consolidate at the end of the 1990s. It is only in the past two years that the industry has begun to invest in growth again but it is still fearful of damaging shareholder returns. A new focus on volume has led to companies retaining unprofitable assets rather than swapping them out for longer-term growth prospects, and, in the downstream, companies have disposed of quality assets during periods of low margins in order to meet unrealistic targets.

2.7 Integration or Atomisation?

In an environment where the industry is a price-taker there are few clear advantages to being operationally vertically integrated. In such an environment, financial vertical integration enables private oil companies to focus on maximising the profitability of each separate business segment. Not surprisingly, this has led to the question as to whether there are actually any benefits to the private oil companies in retaining an interest in all segments of the business, especially as economic theory seems to suggest that focused companies should outperform unfocused ones unless there are transaction costs or threats of ex-post opportunism to justify the vertical chain. The more mature the industry, the lower the likelihood of this, and the oil industry is nothing if not mature.

2.7.1 Private oil companies operate as diversified conglomerates

If the private oil companies now operate as conglomerates there has to be a financial benefit to keeping them together. Today, financial fashion is against conglomerates. Theory says that investors are able to meet their needs better by making their own allocation of capital. In addition, management theory also states that the competences needed to run different businesses are so different that a single set of managers will not be able to run them more efficiently than a focused management for each business. In addition, any group of businesses requires some sort of corporate centre, which will incur costs. In order to justify these costs there has to be a real synergy between each of the separate business units, which may or may not exist. The industry response to this has been to slash to corporate centres and make each business segment more accountable financially, but having achieved this, is there still any benefit from retaining the separate operations under the umbrella of a single company?

2.7.2 Mega-mergers justified on size arguments

The mega-mergers of the past few years were sold to the equity market on the grounds that increased size, existing relationships and other structural considerations would continue to bestow

significant economic advantages on the newly formed companies. In particular, it would give these 'super majors' advantages in a number of countries where there are few competitors, where the right to own or access reserves is limited, and capital and risk requirements cannot be met through local financial markets. In other words it was argued that significant advantages would continue to flow through to the largest companies. In the case of Exxon and BP, it was also argued that since these companies were already outperforming their peer group before they merged with Mobil and Amoco, the mergers provided an even stronger platform for leveraging their exploration and operating skills.

An additional motive was that the increase in size would give the companies a much broader portfolio of projects and increased their dominance in many of the most promising exploration provinces in the world. Even in a low price environment it was argued that the large companies could continue to sustain substantial levels of investment in a number of projects, unlike their mid-size peers. Size was also argued to have enhanced the ability of companies to negotiate access to new reserves. The mere facts that the 'super majors' are involved in all parts of the energy chain and have such a large share of the industry 'know-how' are thought to be a major advantage. Saudi Arabia recently invited the super majors to participate in several potential gas projects because, in our opinion, they have a superior track record of managing projects that involve every aspect of the oil and gas business.

Despite the recent consolidation in the industry there still remain specialist players based on specific products or pieces of the value chain. In fact, the specialist players can play an important role in the development of specific projects where host nations might not wish to work broadly with the majors. As we have argued above, the development of spot and forward markets has reduced the need for vertical operational integration and with the control of technology no longer the preserve of the super majors it has been possible for the 'niche' companies to grow.

2.8 Market Inefficiencies that Favour Integration

Economic theory relating to operational vertical integration as

well as the unfashionable conglomerate structure seem to point towards atomisation of the private oil industry. In addition, the creation of niche players would suggest the industry is already in transition towards atomisation. However, economic theory ignores all sorts of other inefficiencies and pre-conditions which the industry is able to exploit. Economic theory assumes relatively unregulated and open national economies, fully efficient risk and capital markets, the absence of political barriers and fully transparent relationships with suppliers, customers and staff. As these conditions are not usually fulfilled, scale and scope are still extremely important in a number of markets and the growing gap in size and competitive power is likely to continue to separate the super majors from the rest of the industry.

As we showed earlier, the ability of large private oil companies to set prices was a catalyst to operational integration in the private oil industry. In all likelihood the inefficiencies highlighted above are the key to the larger private oil companies retaining an interest in all parts of the value chain. They enable the companies to maximise their profitability by exploiting inefficiencies across the chain.

2.8.1 An artificial oil market

The value of some of these inefficiencies is hard to quantify but the impact on corporate structure and strategy is often clear. It could be argued that until the oil price shocks of the 1970s the inefficiency best exploited by the private oil companies was the lack of a clear price-setting mechanism for crude oil. This manifested itself in an oil industry extracting the maximum economic rent it could from its refining and marketing operations. The attractiveness of this part of the business resulted in massive investment, the entry of a whole raft of new competitors and significant fragmentation. The oil crises of the 1970s took the oil price control out of the majors' hands. This in turn led to this part of the industry struggling with a surplus of capacity, a situation that it is still trying to resolve today.

Of course the transition of the private companies from being price-setters to price-takers led to a new market inefficiency that the industry is able to exploit. OPEC has been in effective control of the crude price since the oil price shocks of the late

1970s. In a free market, the price of crude oil would fall to the marginal cost of supply. However, the OPEC policy of limiting supply has meant that the marginal cost of supply has been kept artificially high. The private oil companies have responded to this market inefficiency by shifting their capital away from refining and marketing operations towards E and P. Figure 2 shows the increasing importance of the upstream business in terms of capital expenditure since 1990.

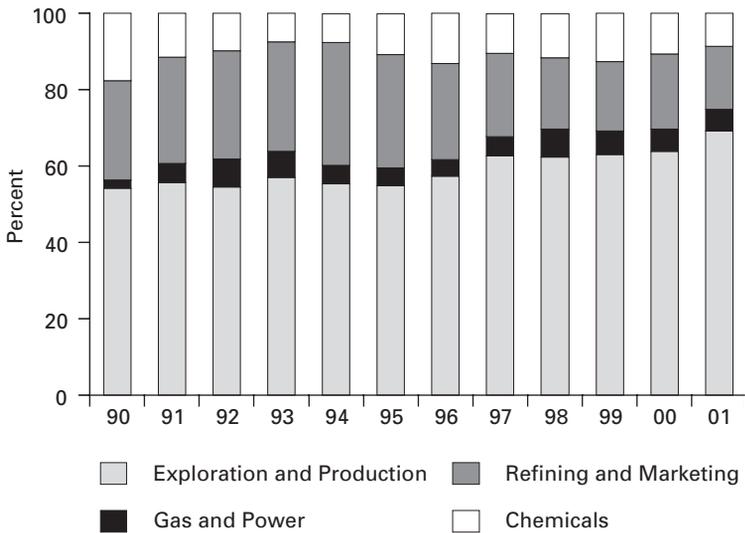


Figure 2: Capital Rotation 1990 to 2001

Source: Company data (Amoco, ARCO, BP, ChevronTexaco, ConocoPhillips, Elf, Eni, Exxon Mobil, Mobil, Norsk Hydro, OMV, Petrofina, Repsol, Repsol YPF, Royal Dutch/Shell, Statoil, Texaco, TOTAL).

The upstream part of the business has always been the most profitable for the oil industry. However one has to distinguish between those projects that were developed prior to the oil price shocks of the 1970s and those developed afterwards. We define those projects developed prior to the oil price shocks as ‘legacy assets’. In other words, they are assets that were awarded to companies under fairly lenient licensing terms and were devel-

oped with oil prices significantly lower in real terms than today. Today, many of these assets are still producing and have book values that are well below replacement cost values. In contrast, many of the post-shock upstream assets would not have been developed unless the oil price had been expected to be sustained at artificially high levels. For those projects developed under unrealistically optimistic long-term oil price forecasts, returns have been very disappointing.

New realism about the volatility of oil prices has led to the private oil companies taking a hard look at upstream costs. In fact over the past twenty years worldwide finding and development costs have come down in real terms, from a peak of \$21 per barrel to just over \$4 per barrel. In addition, operating costs have fallen from just over \$6 in 1981 to \$3 per barrel. We now live in a world where industry can exploit upstream reserves and meet internal hurdle rates if the oil price were to fall to around \$12 per barrel. Little wonder then that the private oil companies continue to exploit the arbitrage between an artificially high oil price and an ever decreasing cost base.

The changing nature of the oil market gives the private oil companies the perfect long-term excuse to remain integrated. By being exposed to different parts of the business they remain resilient to long-term structural changes in the market. After all, companies exposed purely to downstream operations twenty years ago would still be waiting for any sort of financial return and in all probability are unlikely to have survived in the equity markets. That said, the larger private oil companies' financial performance has been dragged down by poor downstream returns, leading to questions by the market as to whether they need to retain those assets.

2.8.2 Minimisation of tax and interest

We argued above that the private integrated oil companies are now financially integrated and it is in this area that a number of market inefficiencies remain to be exploited by the industry. Being financially integrated means that the company retains full control over the cash flows being generated across each of the business segments.

The large private oil companies are unique in that not only do

they operate in all of the business segments but they also operate in these segments across political boundaries. A high degree of integration will inevitably mean that there is an important element of arbitrariness in the allocation of overhead costs to different operations and the prices at which goods and services are transferred between the subsidiary entities of the firm. In effect they can determine the profit that arises within each of the different countries that they operate. For the largest companies, the use of tax havens is much less important than the allocation of charges for the use of research results, patents, and managerial services. However, it all means that it is possible for them to optimise their debt structure in order to minimise interest payments and it is possible for them to try to shift income from high to low tax regimes.

If every country had the same tax rate for each business there would be very little scope for companies to minimise their tax burden. Equally, if one country had extremely punitive tax rates and another had minimal rates, it would be natural for companies operating in both countries to try to maximise their income in the country with the lowest rate. In effect, differences in tax regimes are there for the integrated companies to exploit to the maximum in order to reduce their tax burden. The difficulty comes in trying to measure the exact benefits that they gain from exploiting the differences. Quite aside from the differing operational shape of each company, there is also the issue of financial disclosure. Most of the major integrated companies do not provide a detailed regional breakdown of taxation, with the exception of Shell. Even then it is very difficult to measure how much of a benefit is being achieved as the allocation of tax on a country basis is not disclosed, nor is the amount of debt or overhead allocated to particular countries. We have highlighted in Figure 3 the average 2001 tax rates for the major oil companies relative to the contribution to net income from exploration and production. One would expect to see tax rates increase with increasing contributions from exploration and production where tax rates are significantly higher than corporate tax rates in most countries. However, there is no apparent relationship suggesting that this group of companies with operations that are geographically diverse are able to minimise their tax liabilities.

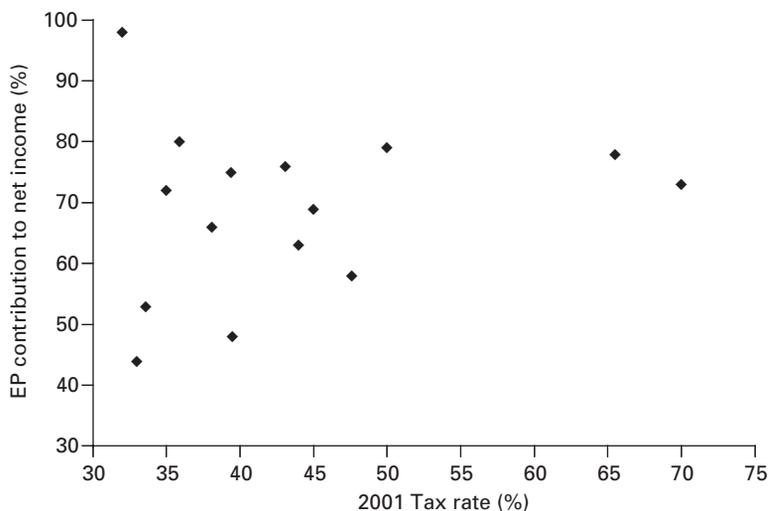


Figure 3: Highly Taxed EP Operations fail to show up in Corporate Tax Rates

Source: Company data

2.8.3 *Trading opportunities*

We stated above that the increasingly liquid markets had lessened the need for companies to remain operationally integrated. We also argued that the financial integration of the majors relied on a transparent crude and product market to tie the various businesses together. In a perfect market, there would be no scope for integrated companies to exploit market inefficiencies, but such a market does not exist. As a result not only do the trading arms of the major integrated companies try to exploit market inefficiencies but there have been recent legal cases where companies have actually created the inefficiency in the first place. For example, there have been a number of times when a particular company to its own advantage has squeezed the Brent crude market. There are clearly legal limits as to the extent to which market inefficiencies can be exploited, particularly when one company seems to dominate the market. For example, when BP acquired ARCO the regulators insisted that disposals were made so that one company could not dominate the Californian and Mid-West product markets and so that market inefficiencies

could not be created artificially. However, market inefficiencies are often short-lived. The example of Enron highlights, on a large scale, how companies can exploit market inefficiencies through trading but in doing so they create a more liquid market, which in effect closes the original inefficiency.

The extent to which companies exploit market inefficiencies is very difficult to quantify. Companies and the trading arms of major financial institutions do not disclose trading profits or losses in their financial accounts. They are also very reluctant to answer any questions relating to the profitability of the trading arm. In fact the only time we are likely to hear of trading operations is when major losses have been incurred. However, the importance of the trading divisions of the majors cannot be overstated, as it is they that control the physical flow of product from and to each of the business segments and it is also they that can try to exploit both the physical and futures market to maximum advantage. For the smaller single segment companies, such opportunities do not exist to the same extent.

2.8.4 Regulated markets and national economies

Increasing deregulation has provided both threats and opportunities for the major companies. For the major integrated companies it has offered market access that has previously been denied. However, in order to achieve this they have often had to embark on strategic alliances or joint ventures in order to navigate the barriers that may still linger on. For the privatised national oil companies, deregulation has opened up new financing opportunities that were previously denied. From a risk point of view, the fact that all markets are not fully deregulated means that integrated companies that operate across regions have a competitive advantage over those that might be exposed to the regulatory changes in one country alone.

In a fully deregulated market, equal competition would mean that there would be no possibility for profits to remain artificially high. However, there are many examples of companies that retain a prominent and often protected position within recently deregulated markets. The best examples of this at the moment lie within Europe with the oil companies that were privatised over the past decade (e.g. TotalFinaElf, ENI, Repsol, Statoil). In the

case of ENI, the company maintains a very strong position in the Italian gas market, effectively shutting out all major competition. In the case of Norway, the recent abolition of the GFU means that Statoil retains its position as the dominant gas company with a 70 per cent market share in the Norwegian North Sea Shelf. This restricts the level of competition with that company and puts it in a preferred position.

Elsewhere, the integrated companies often take financial risks by entering a regulated market at low cost hoping to benefit from future deregulation. Private oil companies are now making large investments in Russia and China, not only because they offer potentially strong growth opportunities but also because there is hope that deregulation will open up the possibility of significant new investment opportunities and increased margins. Unfortunately such bets can go wrong, as was recently demonstrated by Repsol in Argentina, where not only did its hopes of deregulation in the gas market disappear but the financial crisis in that country pushed the company to the edge of financial ruin.

2.8.5 Political and technological barriers

Political and technological barriers have always confronted the oil industry. Up until ten years ago political barriers effectively ruled out investment in most OPEC countries and those countries under communist rule. At that time, technological barriers prevented companies from exploiting reserves in deepwater reservoirs. Smaller niche players were able to enter politically sensitive areas but they did not have the financial resource to take on the major projects. However, smaller companies were not prepared to take on the risks involved with frontier technology.

The changing political playing field combined with tremendous improvements in technology have opened up a whole host of new investment opportunities and it is the major integrated companies that are best placed to exploit them. They have the financial resource and are able to accept the risks associated with them without compromising the financial health of the whole company. For example, the signature bonuses in Angola at one point in time exceeded \$400 million, more than the average annual cash flow of most independent E and P companies but well within the annual cash flows of most of the majors.

Invisible barriers also exist that will favour one set of companies over another. Smaller independent companies will argue that they are able to enter politically sensitive countries, as the host nation feels threatened by the financial strength of a large company. Equally, companies domiciled in politically neutral countries will argue that they have the advantage when trying to enter countries that might have poor relations with the West. The impact of the sanctions on Libya, Iraq and Iran by the USA has effectively closed the door on investment by companies domiciled in that country, leaving the door open for others to enter. European and Russian domiciled companies are now courting each of these countries for investment opportunities as exemplified by the recent deals signed in Iraq and Iran.

Despite all of the counter-claims by each group of companies, it is clear that competitive advantage continues to lie with the major integrated companies. Major infrastructure projects are all being awarded to the integrated companies because of their track record of being able to manage large projects. Smaller independent companies simply do not have the experience to do this, or indeed the financial capability. It is interesting that the gas projects in Saudi Arabia are more likely to be awarded to the major integrated companies than to a consortium of specialised companies. In other words, the Saudi government is prepared to let one company take the project risk rather than have to form a relationship with a whole series of separate companies. In future, increases in OPEC production will rely on investments by private oil companies, but the door to these opportunities is likely to remain closed to the smaller niche players.

2.3.6 Fully transparent relationships with suppliers and customers

One of the main arguments in favour of integration relates to the cost of internal versus external transaction costs. In a fully transparent market, there would be no advantage to integration if transaction costs externally were the same or lower than those that could be achieved internally. However, relationships with customers and suppliers are not fully transparent. For an independent company this lack in transparency and bargaining power can lead to a squeeze in profitability. For the major integrated companies that operate over country boundaries, increasing

transparency can lead to greater bargaining power and drive down costs with suppliers. In addition, greater transparency of the relationship with customers can create opportunities for profit maximisation, particularly in the refining and marketing business.

The use of e-commerce has also helped companies drive down supply costs. The major oil companies now quote their savings as a result of 'e-transactions' in terms of billions rather than millions of dollars. Its use extends from the simple purchasing of supplies to the tendering of rigs and major development projects. However, the increasing importance of e-commerce in the industry has also narrowed the competitive advantage between various oil companies although large firms tend to have greater bargaining power.

2.9 Firm Specific Arguments in Favour of Integration

Before we move on to discuss the arguments in favour of retaining the current size and structure of the large integrated companies we must distinguish between size and shape. It may be true that to thrive in certain energy markets it is necessary to be large. It may independently be true that it is necessary to be integrated. The recent mergers might have created a new class of company with advantages based on size and scale but there still remain focused players who have the skills to compete with any company in the industry. In essence the industry has become polarised with companies in between these two classes, including the smaller integrated companies or large independents, being squeezed out and left in the cold.

For the larger integrated companies the arguments in favour of retaining their size and shape are the same as those applied to any company that has embarked on a strategy of multinational diversification. First of all there is the ability to grow by entering additional businesses and the other is to grow by extending operations of existing businesses into additional country markets. However, the key reasons to remain integrated include the full capture of scale and experience, opportunities to capitalise on cross-business economies of scope, opportunities to transfer competitively valuable resources from one business to another and from one country to another, the ability to leverage use

of a well-known and competitively powerful brand name, the ability to capitalise on opportunities for cross-business and cross-country collaboration and strategic co-ordination and finally the opportunity to use cross-business or cross-country subsidies to gain competitive advantage over rivals.

All of these issues essentially relate to internal information flow. An integrated company, where internal barriers between business segments are minimal, should have a competitive advantage over a specialised firm that has to deal with external information, which could lead to extra costs or delays. Since one of the boundaries of any firm is the limit of its internal information flow, the extent to which it decides to push that boundary out must depend on the reward it expects to gain from the costs it will incur. However, the financial benefits of internal information flow, which can be quite substantial, are difficult to quantify.

2.9.1 Opportunities to capture full economies of scale

In some parts of the oil business the volume of sales needed to realise the full economies of scale and to benefit from the full curve of experience is sizeable. In the refining and marketing business experience over the past twenty years has shown that the chances of achieving a decent return to shareholders can only be achieved by operating across the boundaries of a single country market. Hence the drive to horizontal integration of the refining and marketing business, which is aimed at increasing market share and lowering distribution costs, mainly at a regional level. With the greater sales volumes provided from selling to buyers in a greater number of country markets, companies are able to drive harder bargains across the chain. In addition, refineries are able to gain the economies of higher utilisation rates. Most importantly, the dominance on a regional basis of a refining and marketing operation enables companies to achieve an efficient scale of operation in production, distribution and marketing, and at the same time spread overhead costs over a greater volume of unit sales.

Diversification gives the integrated company a variety of sources of cash flow, making these companies more attractive to the debt markets. The size and breadth of operations gives

them greater access to lower cost debt than is available to smaller less diversified companies. The cost of capital for integrated companies is lower than for companies that concentrate on one business segment alone, despite the standard argument that investors can construct their own portfolios and are therefore indifferent to company specific risk. This conveniently ignores the biggest risk of all, that a company in the chain will default, which results in a high cost both to providers of debt and equity. With many of the major companies having higher credit rating than that of the countries in which they operate, the role of the major becomes that of an international financier with the ability to finance major projects relatively cheaply. This ability gives the larger integrated companies a competitive edge over smaller more focused rivals.

2.9.2 Opportunities to capitalise on cross-business economies of scope

The oil industry is still rather immature in leveraging on its own network of relationships across businesses and borders in order to benefit from economies of scope. For example, the private oil companies that utilise the same distributors and retailers worldwide could diversify into new businesses using these same worldwide distribution channels at relatively little incremental cost. That the oil industry has not historically taken advantage of these networks has primarily resulted from the inward focuses of each segment of the oil industry value chain. In addition, the role of the customer has in the past tended to be ignored by an industry which has focused on delivering the big project but has been very weak on keeping the smaller customer happy. It is only in recent years that the private oil companies have begun to question how they might expand their role into being multi-energy companies.

Historically, the private oil companies' only contact with the outside world has been either within the trading divisions or at the marketing interface. It can be argued that the trading divisions of companies have been at the forefront of trying to capitalise on the various cross-industry activities by expanding the range of products and services they buy and sell both internally and externally. With the same cost base and an increasingly liquid market there is no doubt that firms involved in all business

segments have benefited financially. In fact in some companies it could be argued that the trading divisions are the glue that actually holds the separate businesses together.

At the marketing interface with the customer it is only recently that companies have begun to try to increase the scope of their businesses. Initially, this has been through the introduction of very specific and unique products but more recently the companies have begun to question whether they should assume the role of multi-energy, multi-utility or multi-service companies. Deregulation in the utility industry in Europe and subsequent consolidation has facilitated the formation of a whole new set of multi-utility companies that can offer the customer gas, electricity and water. Some companies, such as Centrica, have gone a step further by diversifying into financial services and car maintenance. Very few oil companies have taken up the role of being multi-energy companies and much of this reticence seems to result from a lack of understanding of the small client base. It is quite likely that the private oil companies are watching how these new companies succeed (or fail) before transforming themselves further in this direction. However, there is no doubt that the industry, with its extensive multinational network of distribution channels, is being under-utilised.

2.9.3 Opportunities to transfer valuable resources from one business to another

Diversification into new business with resource-related strategic fits at various points along the value chain offers significant competitive advantage. Technological expertise and know-how in one business can be transferred to other existing or newly entered businesses with opportunities to make competitively advantageous use of such expertise. In the oil business there are numerous examples of knowledge transfer. One good example is the technology involved in the gas-to-liquids process, which was first utilised in refining but which is now being applied on a much larger scale in the E and P part of the business in order to commercialise large volumes of stranded gas. Additionally, processes discovered in the petrochemicals industry have been utilised in the liquefied natural gas (LNG) business, experience from operating tankers has led to the development of offshore

floating production vessels, and the commercial development of some petrochemicals has helped to improve the secondary recovery of certain oil fields. It could be argued that such cross-business knowledge transfers would have occurred anyway within a totally segmented industry. However, it is more likely that the knowledge base available to the integrated company made such transfers more feasible and for at least a short period of time might have given it a competitive advantage.

For the multinational company, the ability to transfer the experience and expertise gained in one country to similar businesses operating in different countries has been a major factor in the success of the private integrated oil companies. In particular, in the E and P business, the understanding of the sub-surface reservoirs has been greatly enhanced by knowledge transfer from one country to another. In addition, transfers have often led to major advances in understanding, which ultimately led to further resources being discovered in the originating country. For example, the experience gained by BP and Shell in understanding the subsurface geology of the Gulf of Mexico and offshore West Africa has led directly to the discovery of large volumes of oil in each province. Equally, regional geological studies based on large amounts of data in producing basins have meant that the risks of failure are limited when a company decides to enter a new province. In refining, the development of new processes to de-bottleneck plants in one country have been used to improve productivity elsewhere. Finally, in marketing the understanding of local markets and buyer behaviour and the customs of one country often provide valuable clues and faster learning about markets and buyer behaviour of other markets.

2.9.4 Opportunities to leverage a powerful brand name

Most of the large private oil companies have gone to great lengths in order to establish brand names that are well known and respected in most parts of the world. Indeed for BP and Shell a symbol alone is enough to recognise the brand. BP, Shell and Exxon all exploit the value of their names and benefit from added sales and market share that they can gain simply on the trust that buyers have in their brand name. One only need look at the impact that the BP and Shell brand names have had

when new franchises have been opened in Russia, China and other developing countries. None of the larger oil companies need to spend money to gain brand recognition, leaving them free to focus on making customers aware of what services and goods are actually on offer. Whilst it is impossible to put a value on the brand name it gives massive leverage in enabling other parts of the business to be established and for new products to be introduced. In short, the global brand name is a source of huge competitive advantage.

2.9.5 Ability to coordinate strategic initiatives and activities across businesses

The ability to coordinate strategic initiatives across businesses is perhaps one of the most important arguments in favour of remaining integrated. At the highest level the most tangible evidence of this in the oil industry has been the efforts to improve profitability across each business segment. For companies such as BP, management successfully instilled a culture dedicated to making the business work better and more efficiently across the company. Such was the success in implementing cultural change that when the mergers with Amoco and ARCO took place only those staff who bought into the BP culture were in effect allowed to stay. Although painful, this has ultimately led to the formation of a company with a single internal identity culture. Both Exxon and Royal Dutch/Shell have unique corporate cultures, but in the latter case the importance of local operating companies within the structure of the company has meant that strategic initiatives have been more difficult to implement than for its competitors.

Efforts to improve profitability have historically focused on cost cutting. Co-ordination across businesses to buy into new profitability targets has been paramount. After all, there would have been little point in 'giving the stick' to one business segment if other businesses were free to carry on as normal. However, the fact that the industry was relatively unprofitable across each division at the start of the 1990s, based on what the industry defines as 'normal business conditions', meant that it was relatively easy to set business wide targets. The alignment of remuneration to company stock performance has also helped.

More recently the strategy of the major integrated companies has shifted more towards growth although retaining profitability remains an important target. Within the integrated company the ability to coordinate this shift in strategy is improved, as there are more investment opportunities available to pick and choose from in order to deliver the new targets.

Research and development remains a small part of the overall oil company budget. However, the fact that most companies now have a combined effort for all related businesses, as opposed to letting each business or country fund and direct its own effort, means that expertise can be merged worldwide to advance core technologies. For companies like Shell the research and development effort is now responding much more to the needs of the localised businesses but experience gained is quickly shifted across businesses.

Although internet-fever in the equity markets has long since passed, the impact that it continues to have on the oil business is tremendous. The rapid exchange of information has enabled management to gain much greater access to key business drivers and results. It also enables them to make better-informed decisions all the way down the value chain. However, it is in the sphere of e-procurement that companies have gained major cost savings. It offers them the opportunity to better manage cross-business, and cross-country coordination of purchasing and procurement from suppliers, from collaborative introduction and shared use of e-commerce technologies and online sales efforts, and from coordinated product introductions and promotional campaigns. In the oil industry effective supply chains are all about automation and a good e-commerce solution includes sourcing, purchasing (either through established suppliers or electronic market places), delivery and payment. For the integrated oil companies web-based supply chain solutions have enabled them to streamline all of their supplier relationships, reduce processing and material costs, track supplier performance and reduce inventory levels. The impact of all of this has been to reduce costs dramatically to the extent that firms that are less diversified and less global in scope have fewer opportunities to exploit the benefits and have a competitive disadvantage to the major integrated companies.

2.9.6 Opportunities to use cross-business subsidisation to out compete rivals

A diversified multinational company can use the financial and organisational resources it has from its different operations to cross-subsidise a competitive assault on the market position of rivals. Single business companies are automatically at a disadvantage against a diversified company that is willing to accept lower short-term profits in order to establish a long-term competitive position. One good example of this from the oil industry has been the recent price wars in the petrol retail markets of Europe and in particular in the UK. Here the efforts by the majors have effectively squeezed the independent retailers out of the market. Only constant government surveillance, and competition for the hypermarkets, has prevented these companies from really exploiting a strong market position.

The larger integrated business can also decide to allocate funds from one business area in order to fund long-term investments in another. For example, the decision to invest in LNG plants, which may not actually generate returns for several years, is more easily taken by a firm that can draw on cash flow and technology from other business than by one that might have to rely on the debt markets for finance.

2.9.7 Combination of advantages is potent

Companies that are diversified and compete globally can draw on several of the competitive advantages shown above in order to out compete a domestic-only or a single business segment rival. In fact it is quite likely that these advantages are the key factors behind the superior financial performance of the financially integrated oil companies relative to their single segment rivals.

2.10 Should Companies or Equity Markets Diversify?

We have also highlighted above some of the market inefficiencies that favour integration and have shown how cross-fertilisation can boost the cash flows of integrated businesses. However, it is still an open question as to whether diversification can be accomplished more efficiently by investing across business specific traded stocks or by firms diversifying across business segments.

Studies have shown that in efficient markets, the transaction costs associated with investor diversification is often much lower than the costs and premiums paid by firms doing the same. In other words, investors in publicly quoted firms can diversify far more cheaply than firms can. However, it could be argued that investors are unable to diversify across all the business segments as the larger firms hold a monopoly over certain investment opportunities simply because they are integrated. For example, the mainly small and domestic exploration and production companies that are independently quoted on equity markets do not have the same investment opportunities as the integrated oil majors, and it is not true that investors can synthesise portfolios for themselves, rather than acquiring them pre-packaged in an oil major. So within the oil industry, is it better for the market or the industry to be diversified?

2.10.1 Assessment of risk will alter market valuations

At the heart of this debate is the valuation that the equity market places on the cash flows generated either by integrated companies or by focused companies. The valuation of any cash flow by the equity market will naturally take into account discount rates that reflect the riskiness of cash flows. In particular, the cost of equity will incorporate a risk premium for equity risk and the cost of debt will incorporate some element of default risk. For the equity investor, risk can be defined as the likelihood of a different return being achieved on an investment from the one that is expected. Clearly different types of investment will have different levels of risk.

For all firms, factors which affect risk and hence valuation are both firm specific and market wide. In the case of integrated oil companies we have shown above that most of these factors help to increase profitability and act to reduce firm specific risk. In addition, they combine to increase integrated companies' cash flows. However, it is necessary to discuss whether the valuation that the market places on the cash flows of an integrated firm would be any different from the value that it might place on the sum of the cash flows that would be generated by demerging the company into separate businesses. This discussion is also at the heart of the current debate on the structure of the industry.

2.10.2 Impact on cost of equity and debt

One of the arguments cited by many commentators in favour of oil companies remaining integrated relates to the volatility of earnings. Mid-cycle business conditions rarely exist in any particular business segment at any point in time. It is even rarer for mid-cycle business conditions to occur in all business segments at the same time. Although it is equally unlikely for peak business conditions to occur in one business segment at the same time as weak business conditions in another, there is no doubt that the diversity of businesses in an integrated oil company gives some protection from the extreme volatility in earnings experienced by single business companies.

In principle, investors should be able to construct portfolios that leave them indifferent to company-specific risk. But diversification is not a defence against complete insolvency emerging in one part of the chain. Integration is, and this reduces the cost of debt, and may also have a positive impact on the market value of a company's equity, though this is very hard to measure accurately. Therefore a company that is involved in a single business segment is likely to find it more difficult to raise finance. In particular, it is likely that this difficulty might arise at exactly the point in time when finance is really required.

A clear example of this can be found among the independent E and P companies, which have always been subject to the often-extreme volatility of the oil price. The historic business model of the E and P companies has always taken the form of overspending at the top of the business cycle and struggling to repair balance sheets at the bottom of the cycle. Because it has been impossible to raise debt when the business cycle has been at its lowest, the equity market has often been used as the last port of call to help solve companies' problems. Unfortunately this option has closed recently as the equity market has become sceptical of the business model, especially as returns in the independent E and P sector have historically been very poor.

In the refining and marketing business, the overcapacity has meant that little new capacity has been added for over a decade. However, the industry faces two important trends, first the increasing environmental legislation that will force companies to invest to increase product specifications, and second the prospect

that at some point in the future the increase in demand for products will eventually catch up with available supply. Both of these trends mean that the refining as a whole will require significant funding. Unfortunately, the independent refiners may find it difficult to raise debt or equity when margins are depressed and may only be able to raise capital at the top of the business cycle. In effect, this means that the integrated companies will be able to capture more of the economic rent from the business cycle than will the independent company.

2.10.3 Raising debt and equity

The difficulty of raising debt or equity could also affect a company's value in different ways. It could lead to the deferment of a project, which obviously leads to value leakage, but in some cases it could lead to a project being abandoned. Although the independent company might have a very good project that it can invest in, management might actually reject such a project if it has to raise new capital to finance it. Apart from the debt capacity issues raised above, one additional reason relates to potential dilution of shareholder value. Since the managers usually have much more information about the true value of any investment than equity holders then more equity might have to be raised at less than its true value in order to finance the project. This action alone will dilute shareholder value.

There are many examples across the industry of the independent companies suffering from a lack of cash to invest in projects, especially projects that might lie in remote or politically sensitive areas. The UK independent, Premier, was not only forced to raise debt at punitive interest rates in order to finance a major gas project in Myanmar, but the impact of a period of low oil prices forced the company into an effective debt for equity swap which diluted shareholder value. Shortage of cash has also forced the independents to farm-down or be carried through major development projects. All these actions mean that shareholders in the independent companies carry greater risk of value being diluted and this has a detrimental impact on the values and multiples that the market is prepared to place on such companies.

2.10.4 Tax benefits

We have discussed in some detail above the fact that integrated companies are able to optimise their debt structure in order to minimise interest payments and to try to shift income from high to low tax regimes. Naturally, in comparing two companies that operate in the same country, the market is likely to place a higher value on the one, which, for the same efficiency of operations, has a lower tax rate. For the independent E and P companies that operate over a number of countries there is some scope to reduce overall taxation especially with regards to exploration expenditure. However, for companies whose operations are located in one country there is often little flexibility to reduce tax payments. One exception to this is Norway, where companies are able to exploit the significant difference in the tax rate between offshore and onshore operations. There, most companies operating will try to allocate their income to activities that take place onshore, and expenditure to activities that take place offshore, in order to try to reduce the punitive offshore rates. For the independent refining companies whose operations are often concentrated in one country the ability to minimise tax payments is limited.

2.10.5 Debt capacity

We have discussed above the fact that an increase in the variability of earnings can lead to a decrease in the debt capacity of the firm. This is because the cost of debt is likely to increase, as the company appears to become much riskier to the debt and equity markets (Figure 4). For the purposes of the discussion on whether integrated companies should demerge we need to discuss here what the likely outcome would be on the companies' debt capacity. The initial impact of a demerger is likely to be a fall in the value of the corporate bonds. The higher yield on the corporate bonds will clearly influence the rate at which bonds can be refinanced, and the higher cost of debt and lower profitability would probably have a detrimental affect on the market value of the equity. Clearly the magnitude of the change in the cost of debt will be different across each of the different business segments, being largest for those with low and cyclical margins, such as refining and petrochemicals.

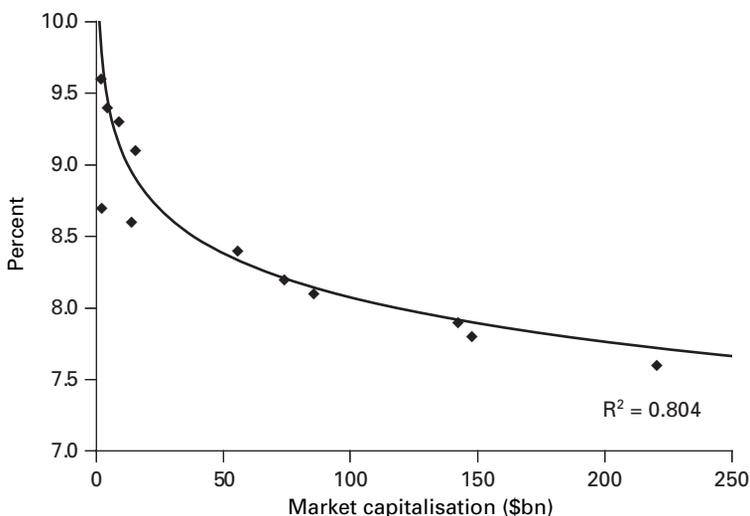


Figure 4: The Cost of Capital Falls as Market Capitalisation Increases

Source: Company data

The impact of a significant reduction in debt capacity might also have the effect of blocking off potential investment opportunities for demerged companies. Independent companies have found it virtually impossible to be part of consortia that are involved in major development projects. In effect, large projects or even certain countries are out of bounds for demerged companies. In an industry that relies on such opportunities to help fuel growth, it becomes a severe handicap and will ultimately lead to a change in company strategy.

Of course, for the major integrated company, if the internal cost of capital becomes disconnected from the external market it could lead to poor business decisions being taken. For example, a company might overpay for an asset if the valuation was based on a relatively low internal cost of capital. We return to this issue later in the paper.

2.10.6 *Impact on market multiples*

We have discussed so far the impact that demerging operations would have on company risk profiles and debt capacity. But we

can gain some insight from the current equity market multiples of different energy sectors to understand whether, in effect the sum of the parts is greater than the whole. We have shown in Figures 5, 6 and 7 various multiples for a range of sub-sectors in the oil and gas equity market, which illustrate that the equity market places different multiples on different business segments.

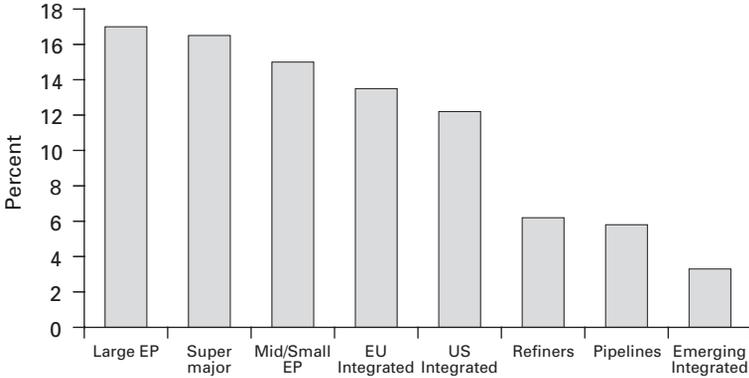


Figure 5: 2003 Price Earnings Multiples for the Sub-sectors of the Oil and Gas Sector

Source: Morgan Stanley

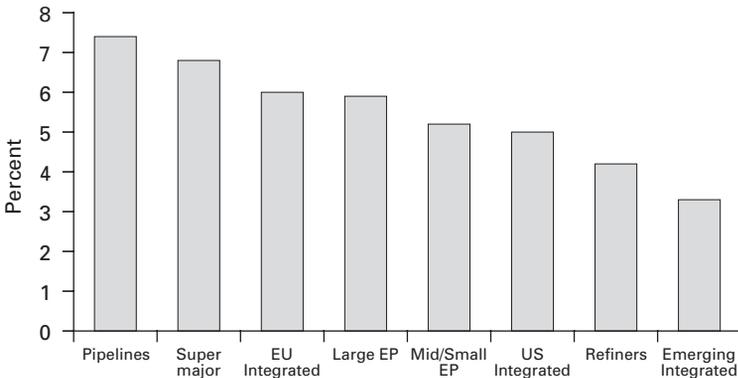


Figure 6: 2003 EV/EBITDA Multiples for the Sub-sectors of the Oil and Gas Sector

Source: Morgan Stanley

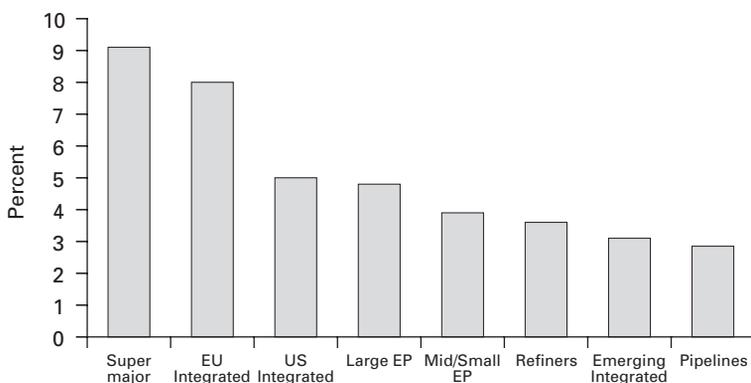


Figure 7: 2003 P/CF Multiples for the Sub-sectors of the Oil and Gas Sector

Source: Morgan Stanley

For example, the high earnings multiples for the large EP companies are a reflection of expectations that oil prices will remain strong whereas the low multiples placed on Refining companies reflect a continuing poor outlook for refining margins. One would expect the integrated companies' earnings multiples to reflect the average of these two groups but the multiples for the super majors reflect the premium that the equity market places on their integrated operations.

There are many reasons to explain the different ratings between the three groups of companies but the primary factor relates to company profitability. The integrated companies command the highest ratings simply because they have a consistent track record of delivering higher profitability as compared to independent companies. In general, the integrated companies have delivered shareholder value whereas independent companies have not (Figure 8).

2.10.7 Scale of business segments is different for majors and independents

The market multiples of the companies that we have shown in Figures 5, 6 and 7 strongly argue against demerging the best

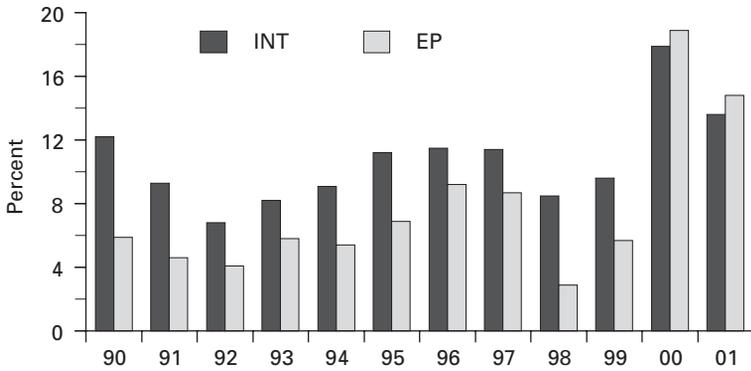


Figure 8: Profitability of the Oil Sector 1991 to 2001

Source: Deutsche Bank

performing integrated companies. After all, there is little point in advocating separation of the businesses if there were to be an immediate fall in the total value of the businesses involved. However, we must be careful not to jump to conclusions based on the companies involved in our analysis. After all, there is very little comparison in the scale of operations of any of the independent E and P companies with those of the upstream operations of BP, Shell or Exxon (Figure 9). In addition, it is very unlikely that if the upstream operations of the majors were separate companies they would be valued the same way as their smaller peers by the equity market. An example of this is provided by the recently privatised Statoil, which is primarily engaged in upstream operations but on a scale much larger than any other independent E and P company. The equity market has determined that the peer group for valuation purposes lies not with pure E and P companies but with the European integrated oil companies. As a result it commands a different set of multiples to the independent E and P sector.

Equally, the scale and scope of the refining and marketing businesses of the majors are completely different to those seen in the independent sector. The majors have adopted a strategy of trying to dominate particular regions in order to enhance regional marketing opportunities and maximise refining throughput. In the USA the downstream operations of the integrated compa-

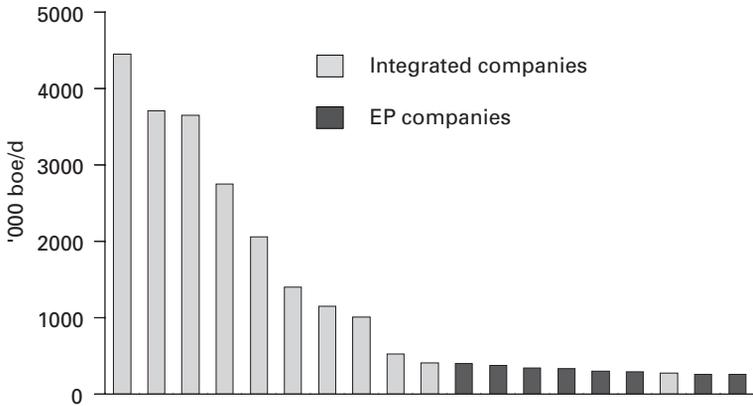


Figure 9: The Contrasting Scale of Upstream Operations in 2001

Source: J.S. Herold

nies by far outstrip those of any of the independent refiners. In Europe, there are few refining companies and no real marketing companies to compare with the majors' operation. As a result it is difficult to say what value the equity market would place on the demerged operations of the majors. What is certain is the fact that very little faith should be placed on arguments for and against de-merging businesses based on the market valuations of companies that bear little or no resemblance in terms of scale and scope to the operations that are present within the major integrated companies. Industry therefore faces the 'perception prison' as the equity market will always compare companies with their peer groups. Value may therefore go unrecognised because equity market analysts are specialised according to specific sectors and they may fail to attribute higher values to businesses than those already accorded to companies within their sector of expertise.

2.11 Business Segment Response to Market and Firm Specific Risks and Challenges

We have argued above that operational, financial and market related issues all militate against the major integrated companies demerging into separate companies specialising in one business. But we need to examine in more detail the strategies that the

integrated companies have implemented in response to market and firm specific risks in order to examine whether we can conclude that the integrated model in the oil and gas business will reign supreme for the foreseeable future. After all, the challenges that the industry faces over the next decade are different from those that it faced ten years ago.

The industry ten years ago accepted that its priority was to improve returns to shareholders before it could possibly contemplate growth. At the same time it recognised the need to deal with the challenge of increased commoditisation, the erosion of competitive advantage due to information technology and the challenge of how to adapt to an increasingly global market. Whilst the industry has succeeded in improving profitability it now faces equally daunting challenges, which affect each of the separate business segments. Today, the biggest challenge for the integrated companies is to kick-start growth. They also have to deal with the impact that this will have on company returns, a subject discussed at length in the preceding chapter. In addition, risks have emerged with regards to international ventures and relationships and there are the ever-increasing environmental pressures.

Within integrated companies, radically different skills and business capabilities are required in each business segment to respond to today's challenges. The skills required to manage an E and P business are radically different to those required in refining and marketing. We can gain insight into the response of each of the business segments to the challenges that we have highlighted above by looking at recent strategic trends and examining whether such trends are likely to lead to greater integration or whether they could eventually drive the different business segments apart.

2.11.1 E and P growth strategies becoming risk averse

The control of costs in the E and P business is a major priority for all private oil companies. The industry does not set its own prices and volume growth relies on profitable reinvestment of existing cash flows. It has long been known that there is a strong relationship between size and cost efficiency in the E and P business (Figure 10). The larger the company the lower the

replacement cost. In an industry that is highly capital intensive the cost of finding and developing reserves drives returns on capital employed. The large private oil companies are able to find and develop reserves for about \$4 per barrel. This breaks down into around \$1 per barrel of finding cost and \$3 per barrel of development cost. For the small explorer the comparable cost is in excess of \$6 per barrel. However, the fact that the integrated companies have lower costs has nothing to do with the benefits of integration. It is purely a function of the size of the firm. The greater the number of investment opportunities open to the company, the better the balance between risk and return that it is likely to achieve. Given that size and diversity seem to be the key to a profitable E and P business small wonder that arguments have been put forward to separate this part of the business.

Currently, the larger integrated companies are struggling to reduce unit costs further after a successful ten-year programme in which costs have almost been halved. The industry has reorganised itself, halved its employment and outsourced many of its traditional activities. However, such efficiency gains are likely to be exhausted in the near future.

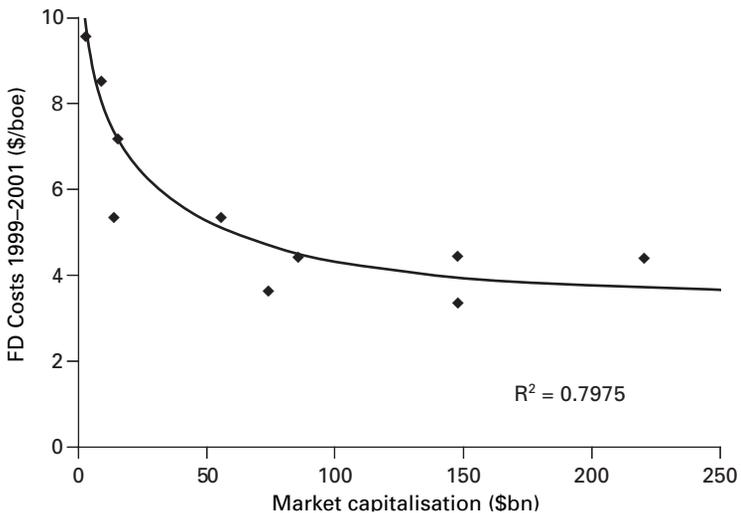


Figure 10: Finding and Development Costs Fall with Size and Diversity

Source: Company data

For the large private oil companies the key to keeping costs down will be access to new opportunities with highly productive reservoirs and low finding and development costs. Such opportunities do exist in the new deepwater provinces but these are mainly only available to the larger companies. The changing political landscape has also meant that countries with large volumes of reserves are now opening up to foreign investment. These governments have recognised that it is better to impose a high marginal rate of taxation on an efficient operation than to continue to rely on an inefficient state oil company.

In the immediate future the private oil companies will continue to increase capital expenditure in what they perceive to be the most profitable business segment. Capital spending in the E and P sector is set to rise in proportion to other business segments as spending accelerates over the next few years. Although the production targets set by the companies might be difficult to achieve there is a real sense now that after the cost cutting of the past ten years major long-term strategic investments have to be made in order to sustain current production levels. It has been estimated that the major private companies will spend more than \$300 billion over the next ten years on major infrastructure projects (Figure 11). About a third of this will focus on developing existing reserves in existing provinces (e.g. Caspian, OPEC countries), but nearly half will be spent on monetising stranded gas.

We have outlined above some of the benefits that financial integration can bring to the E and P business. However, with the exception of the development of deepwater oil, most of this new investment can only be exploited if there is operational integration with other business segments, especially in logistically difficult areas. It is in these areas that the large integrated company has an advantage over the independents on the issue of access. In addition, an integrated private oil company may be preferred if an investment project involves development of a completely new value chain, as is the case with the Saudi gas projects, discussed above.

The E and P business of today is more concerned with production than exploration and with the softening of political barriers the private oil companies now have access to already discovered reserves in sometimes remote parts of the world. It is

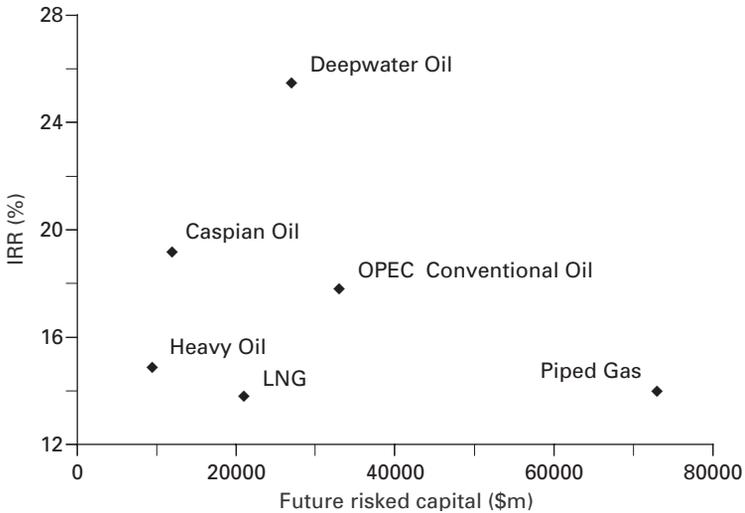


Figure 11: Risked Future Capital versus Weighted Average IRR for Various Projects

Source: Deutsche Bank

clear that the key to realising the value of some of these projects is regional integration of upstream and downstream businesses. In places like China, the private oil companies must be able to access local markets if they are to justify major upstream developments and as a result they are attempting to build an integrated value chain from the gas developments in the west of that country to the growing markets in the east via a new pipeline. In essence, it comes down to a matter of control of the value chain by private oil companies in a country where there is no transparent or liquid commodity market.

Regional integration is also important in Russia and other countries of the Former Soviet Union. For oilfield developments, access to open markets has been a crucial issue and most companies investing in these regions have actively pursued forward integration into pipeline construction to guarantee access to western markets. The Tengiz development in Kazakhstan and other major Caspian Sea projects would not have taken place without the construction of major pipelines. In the case of some Russian projects, integration all the way down the chain to a refinery has

been necessary so that companies can realise the value of refined products when export markets for crude are closed.

Private oil companies are also pursuing operational integration in the mature producing basins of the world. The drive to reduce costs in these areas has meant that once cost reductions within specific business segments have been exhausted specific synergies are sought across businesses. In the North Sea for example, there are clear operational benefits from being able to streamline logistics across each business. In addition, there may be an opportunity to try to revisit the issue of the optimisation of crude oil supplies. It is well known that in the USA, Exxon has always retained close links between its own crude production and its refineries in order to take advantage of location, be able to control supply and therefore be able to minimise inventory. It may be the case that in future the private oil companies revisit the issue of regional reintegration in mature provinces.

2.11.2 The risks of increasing integration in the gas chain

The gas and power segments of the private oil companies have only recently received separate recognition in their financial accounts. This reflects the rising importance of gas as a fuel and the success that companies have had in monetising stranded gas discoveries. Historically, gas discoveries were only exploited if they lay close to market and even today only 23 per cent of gas is actually exported through pipelines or as LNG. However, demand for gas is expected to rise faster than all other conventional fuel types and as a consequence it is interesting to examine the various strategies that the private oil companies are adopting.

In a parallel to the early days of the oil industry, the monetisation of gas has relied on vertical integration to capture the economic rent. With most gas being produced and consumed domestically national champions emerged which effectively controlled the whole chain from production to the consumer. Of course governments regulated the price of gas to the consumer but the lack of any transparent gas market meant that companies extracted the maximum economic rent with little or no competition. In the USA, the benefits of remaining vertically integrated in the gas chain were eroded once a fully developed spot market for gas emerged. In Europe, ongoing liberalisation

of the gas and power industry is breaking up the integrated chains. However, in both the USA and Europe, the advice to many private companies is that as these markets liberalise, they should take the opportunity to create vertically integrated chains in these industries, mirroring the structures that now exist in the oil parts of their businesses.

It seems to us that there are serious dangers in private companies actively pursuing any form of reintegration in the European gas and power markets. The parallel to the early days of the oil business is striking. In the oil business vertical integration occurred at a time when the crude oil market was very small and inefficient. This meant of course that transaction costs were very high if the oil market was used. In turn this gave ever-greater logic to being vertically operational, further reducing market size and efficiency and increasing transaction costs. As a result, the process of vertical integration became self-feeding. In Europe, the lack of a fully developed gas spot market is being used by companies and advisors to justify re-integration of the gas chain. Not only does this fly against the wind of liberalisation but also more importantly it ignores the potential impact of the growing liquid gas market. If these markets continue to grow rapidly, massive structural changes are likely to occur which involve further segmentation of the market into pipeline companies, marketers, suppliers, customers and new entrants. Whilst private companies might wish to become diversified within the European gas market they should focus more on what businesses are likely to generate the best return rather than trying to reconstruct operationally integrated chains.

In the USA the arguments in favour of reintegrating the gas chain have more to do with fears over long-term gas supply and concerns over the liquidity of the gas market. There appears to be a market consensus that the rising demand for gas in the USA cannot be met domestically or from imports from Canada. Private companies concerned about supply constraints are beginning to consider backward integration through the construction of LNG import terminals or the construction of major pipeline projects from either Alaska or Mexico. However, construction of these major projects relies on a gas price that must be sustained above the historical average spot price. The difficulty is of course that as soon as these projects come on stream any potential squeeze in

the gas markets is alleviated and the prices required to justify the investment in the first place are not realised. Companies such as BP have to consider very carefully the benefits of integrating back up the gas chain through the construction of a major pipeline to link Canada with the Alaskan gas fields. It is no surprise that development decisions on many of these projects are consistently deferred and it is likely that many will not go ahead unless there is some Government intervention, either legislative or through tax incentives.

Operational integration in the LNG chain has until recently been extremely important. Company strategies have focused on establishing vertically integrated chains of supply. By this means, it was hoped that enhanced returns could be made from upstream investments in gas production and mid-stream investments in liquefaction facilities. Companies such as BP, Shell and BG have all pursued strategies that involve extending ownership of control both up and down the chain. The integration has in some cases extended even further to incorporate investment in an end-market, such as a power plant. However, rising global demand for gas has triggered a massive investment in LNG schemes such that within a few years the number of exporting countries is expected to have risen from eight in 1996 to over eighteen. The impact of this expansion could actually cause a supply surplus and this will trigger fundamental changes in all processes of the LNG business.

In place of the rigid contractual links between each part of a chain, the new model is likely to incorporate much more flexibility, particularly in the supply chain. With increasing liquidity, the necessity to remain operationally vertically integrated breaks down with each player seeking to maximise profitability either in a particular part of the chain or within a specific geographic region. Evidence of this can already be seen in the strategies of the three largest players in the LNG market. For example, although most LNG supply is expected to remain tied up in long-term contracts, each company is establishing a strategy to reap the commercial benefits of free-range marketing, by using a large fleet of LNG carriers. Shell recently announced that it had signed two twenty-year contracts to buy Nigerian LNG to complement its strategy of investing in LNG re-gasification in the Atlantic Basin. BP is also pursuing a new marketing

strategy of developing LNG markets ahead of supply in order to support its group wide target of increasing gas production by around 8–10 per cent a year. BP was the first company to place orders for LNG carriers where the supply source and the end customer were not contractually secured, and it has also spearheaded the agreements covering marketing of production from the Atlantic LNG plant in Trinidad, whereby each partner is able to separately market its own equity share of production after it has been liquefied.

2.11.3 Extending the downstream business

The combination of a large number of competitors with a surplus of capacity has meant that this segment of the industry has failed to generate an acceptable return on capital employed for nearly thirty years. The drive to cut costs in the refining and marketing business has been taking place now for over twenty years but by the mid 1990s traditional cost-cutting measures had reached their limit. Companies realised that it was impossible to maintain competitive advantage by following the strategy of being the lowest cost provider. For example, in the USA, although costs have fallen by around 50 per cent since 1991, gross margins have also fallen in step with cost reductions. The obvious consequence of this has been horizontal integration aimed at increasing market share and lowering distribution costs within specific regions. In the short term, these mergers have delivered further traditional cost reductions but in the long term the enlarged businesses will face the same competitive pressure that drove them to merge in the first place. This could lead to further horizontal mergers but the opportunities available and the potential legislative barriers mean that private companies will have to pursue other strategies in order to sustain competitive advantage.

The real winners of the recent mergers have been the larger private oil companies who have been prepared to extend their businesses over geographic boundaries and dominate market share. Such players have a competitive advantage over local independents that are unable to compete with the additional benefits that accrue to regional businesses. However, in the future the downstream business is going to have to examine new ways of creating competitive advantage. We have discussed

above the potential for integrated companies to revisit the issue of operational integration with other parts of the business. A large company can clearly optimise the flow of different types of crude oils to the appropriate refinery and the distribution of different quality products to where they are most needed. This opportunity would be closed to the independent refiner.

However, it is further down the business chain that the private oil companies have the potential to create competitive advantage. Although these companies have always been strong in managing major investment projects, their interface with the customer base is still relatively poor. The major private companies are currently undergoing a period of transition in which they are trying to understand the needs of the individual customer. Brand segmentation and the development of specialised products are relatively new to the industry as is rapid response to customers' demands. Utility companies have long recognised the importance of understanding the customer base in order to increase the scope of products that can be made available. Although the marketing divisions of the private oil companies have begun to attack the customer base, there is still considerable scope to examine whether different business models (e.g. multi-energy, multi-utility or multi-service) will give additional competitive advantage.

Integrated private companies are able to capitalise on their downstream experience in other markets in order to gain access to new undeveloped markets. In some regions, access will also depend on investment in other business segments in order to secure the supply chain. In these markets, the strategy will continue to aim at increasing market share as quickly as possible and establish the brand name. BP is currently being very aggressive in its attempts to build up market share in China, whilst at the same time investing heavily in each part of the value chain from upstream to petrochemicals.

2.12 Core Capabilities

Up to this point we have examined the traditional business model of the private integrated oil company. We have shown how the industry has moved from being operationally integrated to being financially integrated. Today the larger private oil companies organise themselves around separate business units and leverage

their scale to maximum effect. However, the industry has core capabilities that could be extended into other areas of business and this might ultimately lead to a transformation of the industry itself.

2.12.1 Project management and financial skill are core capabilities

In our view, the two key capabilities that the private oil companies possess are project and financial management. The oil industry is involved in some of the most complex and capital-intensive projects in the world. Not only have the private oil companies' expertise in managing such projects, but also in contrast to many national oil companies they are usually able to deliver them on time and on budget. In addition, the private oil companies are often more adept than the major lending banks at assessing the profitability of such major investments and have the capacity to finance them internally. Whilst the value of these capabilities is understood with respect to internal projects, we believe that there is real value to be unlocked by extending the use of these skills beyond the firm itself.

The changing political landscape has meant that the private companies have had to forge new relationships, not only in areas of existing operations but also with new countries. For the private companies, access to new investment opportunities is essential and for the host country access to capital is often a key issue. However, the relationship between host governments and private oil companies is a delicate one. In essence, the oil companies act as contractors to the governments of host countries. In this role of contractor, the industry sub-contracts each part of a development to specialist construction or oil service companies.

The extensive use of sub-contractors has led some commentators to argue that major projects could be ultimately developed without the presence of a private oil company. This argument has even extended the debate as to whether the next step in unlocking the value of the integrated companies is the atomisation of the business into separate companies. In our view, such arguments ignore the important issues of finance and project management. We would argue the opposite. It is the fact that the private oil companies can offer these skills and strengths that attracts the host governments in the first place.

2.12.2 A possible extension into banking

An extension of these skills could ultimately lead to private oil companies transforming themselves into major lending institutions to the industry, capitalising on the financial strength of their operations. The treasury operations of the major companies are often larger than some of the countries in which they operate and a further move into this area would be a natural extension of existing business. An acquisition or merger with a major financial institution might help facilitate a move in this direction. At first this might appear to be a major step towards further diversification. However, if it strengthens a company's ability to finance major projects and could offer finance to governments for attractive projects we would view this as the next step in the financial integration of the private oil company.

3. A QUESTION OF PROFITABILITY

3.1 Not as Simple as it Looks

This is the element of the oil industry's crisis of confidence that is entirely of its own creation. The problem stems from confusion regarding what current levels of profitability are, what is achievable, and what providers of capital expect. It is more complicated to disentangle than it looks, for reasons that are specific to the oil industry. In this section we explain what the problem is, how the industry arrived in this predicament, and what we believe it might start to do to resolve the problem. We conclude the chapter with two additional items, the implications of an emerging portfolio of investment opportunities in the gas business, and a look at the problem from an apparently very different perspective, that of the private Russian oil companies. Embedded in the chapter is a section that explains in simple terms the investment theory that we believe can be used to clarify the issues.

3.2 What is the Problem?

The larger oil companies have, over the past few years, generated very acceptable returns on capital employed, and most of them continue to target this at a level of some 14 to 15 per cent. While there are small differences in definition (and we intend to use our own, which will be discussed below), what is meant by return on capital in this context is operating earnings after tax but before interest payments (Net Operating Profit After Taxation, or NOPAT), divided by capital employed, which is taken to be the sum of shareholders' funds (including minority interests) and net debt. It could be conceived as being what the companies generate by way of distributable surplus, after taxation, divided by the money that has been invested in them by their providers of capital, whether in the form of equity or debt finance.

It is customary to compare this figure with a notional cost of capital, to see whether the companies are adding value, the popular vernacular for whether, when they invest an additional

dollar, they make a return on it which is more or less than that which their providers of capital might expect.

We would argue that there are a number of problems with this calculation, and there is a risk that failure to understand them may result in companies making unfortunate corporate decisions. Let us start with the calculation itself. Some of the most profitable assets in the major oil companies were developed or built during the period prior to the oil crises and inflation of the 1970s. They are generally fully depreciated, having outlived their expected lives and pumped greater volumes than was expected when they were developed. Consequently, these 'legacy' assets that have little or no balance sheet value are generating a large amount of cash flow.

On the other hand, significant volumes of investment were undertaken during the 1980s, in the confident expectation that the oil price would now be greatly higher than it in fact is. In many cases, these assets have been written down to a value that reflects their impairment test levels, but they are not contributing much to corporate profitability.

Whether one looks at the consolidated accounts of the oil majors, or the Russian oil companies with their large and lowly capitalised West Siberia production representing the profitable assets, what one sees is a blend of two packages of assets. The resulting return comes out at one number or another, but it is probably not indicative of anything other than a historical accident. It does not reflect the profitability of incremental investments, nor should it do so.

Turning to the question of the adequacy of the return, long-term government bond yields have in recent years been oscillating around 5 per cent on both sides of the Atlantic. Most estimates of the equity risk premium (the premium that equity investors demand for taking a greater risk than they would if they just bought government bonds) are around 3 to 4 per cent. Individual industries carry different levels of risk, reflecting mainly the cyclicity of their profits and their level of financial gearing (debt as a proportion of market values) but the oil industry is not, perhaps surprisingly, a particularly high risk industry. This is because risk is measured in terms of the degree to which an investment will increase the volatility of a portfolio, not how volatile it is on a stand-alone basis (so long

as the risk of default is low, as discussed in the earlier section of this paper). And since the profitability of the oil industry is not highly correlated with the profitability of industry overall, investors do not apply excessively high discount rates to oil company cash flows.

The upshot is that it is probably reasonable to think of the industry having a cost of capital of about 8 to 9 per cent, which means that it should be content to invest in new projects that offer this rate of return. More than that, if it does not invest in projects that involve this rate of return, it is rejecting projects that its providers of capital should want it to undertake. Shooting for a higher target, and achieving it, is emphatically not a good thing, because it implies that attractive opportunities have been turned down. This is likely to be particularly destructive in an industry that has limited scope for profitable expansion, as is the case with the oil and gas industry.

If companies set too high a hurdle rate in order to limit the number of projects that they approve for investment in any one year, a result will be a leakage of value from the inventory of dormant potential projects that did meet their cost of capital but that failed to meet the hurdle rate of return. Hurdle rates of return are an excessively blunt tool to use if the aim is to control the level of capital expenditure in any one year.

The damage done by overestimating required rates of return and consequently under-investing can be illustrated by the following simple calculation. The ratio of the market value of a company to its book value can be stated as follows:

$$EV/CE = (ROCE - g) / (r - g)$$

Where EV = enterprise value, CE = capital employed, ROCE = return on capital employed, r = discount rate and g = growth rate.

This formula, which assumes that we are looking at a constantly growing company that will expand its NOPAT every year at a rate, g, and will maintain a constant return on capital employed (unrealistic but it keeps the calculation simple) yields the result that if a company is to grow its profits at 5 per cent a year, and make an 11 per cent return on capital employed, then with an 8

per cent discount rate it will trade at a market value of its debt and equity (enterprise value) of about 200 per cent of its book value. The calculation is as follows:

$$(11\% - 5\%) / (8\% - 5\%) = 200\%$$

Now suppose that in a desire to maintain a high level of profitability the company were to forgo new growth opportunities. It manages, let us assume, to maintain its current real profits, by expanding at a nominal 2 per cent a year, but it does not grow in real terms. As a result of this restraint, it maintains a return on capital employed of 14 per cent, close to what many of the oil majors are projecting. The result is that it too will trade at twice book value. The calculation is as follows:

$$(14\% - 2\%) / (8\% - 2\%) = 200\%$$

The problem with this approach, we would argue, is that it is highly unlikely that the oil industry, commoditised as it is, actually will offer the opportunity to maintain the profit streams from its constituents, let alone grow them, on the basis of such high return on capital. In other words, far from being sensible and acting in its shareholders' interests, the firm that follows the second strategy is in fact likely to disappoint on two counts, namely, growth and profitability. Far better, we would argue, but completely against the conventional wisdom, to accept that returns on capital are going to come down, that anything above about 8 to 9 per cent is acceptable, and to chase such growth as is available in the industry.

In summary, the answer to what the problem comprises is that it has two related components. The first is that the industry is overestimating its current level of profitability, overestimating its sustainability, and therefore targeting too high a level of return on capital employed. The second is that it is overestimating the demand that reasonable investors could expect of it, thereby risking that it will refuse opportunities for which they would have rewarded it. In an industry in which it is difficult to expand rapidly, the risk is that the companies disappoint unnecessarily on both fronts, growth and profitability.

3.3 How Did we Get Here?

During the 1970s, the oil companies dissipated their crisis-enhanced cash flows in a confused attempt to diversify away from the 'non-renewable' resource. They were unfortunate in their choice of diversifications (it is not necessarily the case that their competitive advantage lies in energy) and they were at least temporarily wrong about the future of their own industry.

The following decade was one of over-optimistic investment in their core areas. The halving of the oil price in 1986 revealed the over-optimism, to which the industry only began to adapt rather slowly. This was then compounded by the severe recession of the early 1990s, at which point its cash flows collapsed.

The result was a new era, that from 1992 onwards. During the past decade, the present generation of senior oil managers has followed the path set by its predecessors. It has concentrated on slashing costs, both operating costs and capital costs. Cutting the former is an unambiguous benefit to investors. Cutting the latter is double edged. If it is possible to sustain the same growth with lower levels of capital expenditure, by improved capital efficiency, then this is of course excellent for investors. If lower capital expenditure is reflected in lower growth, then value is being lost if acceptable projects are being deferred. Given the high capital intensity of the oil industry, it is not surprising that capital efficiency has been given at least as much attention as improvement in operating margins, and this is entirely justified. What makes decision-making difficult is that it is very hard, with an industry in which capital lives are measured in decades, to establish what returns on capital employed actually are. We return to this point below.

By the end of the 1990s, it was apparent that the ability of the larger and better managed companies to reduce their costs further was very limited, if they were to offer the prospect of any growth at all. The result was a series of huge horizontal mergers (BP and Amoco and ARCO, Exxon and Mobil, TOTAL and Petrofina and Elf, Chevron and Texaco) and numerous smaller combinations. These offered the prospect of further substantial scope for cost reduction, and some limited scope for pricing power, though the latter can never be an objective that is articulated. Although the mergers were mainly conducted as paper

transactions, rather than for a cash consideration (Repsol was the exception, with its bid for YPF of Argentina, but that was in many ways an exceptional transaction) they also encouraged another trend that had begun in the 1980s but had become almost universal in the 1990s, the returning of equity capital to the shareholders.

The advantages and disadvantages of buying back shares is a topic on which more than the usual amount of ill-informed prejudice is aired. In theory at least, the situation is very clear. In a tax free and perfectly predictable world, the value of a company's assets would be independent of how they are financed, just as the value of your home is unaffected by the size of your mortgage. In the real world there are a number of distortions that make this over simplistic, of which the most important two are the existence of corporation tax and the effect of uncertainty.

Companies become liable to taxation to the extent that they make taxable profits, and taxable profits are calculated after the cost of interest payments. By contrast, the returns that are distributed to equity shareholders, whether in the form of dividends or of share repurchases, are made out of net of tax cash flows. There is thus an asymmetry to be exploited. If we imagine there being three parties who withdraw cash from a company (the government, the debt-holders and the shareholders) it is possible for the latter two parties to increase their combined share at the expense of the government, by funding the company with more debt and less equity. The resulting reduction in the government's take is generally referred to as a tax shelter. Creating tax shelters adds value.

So why are companies not almost entirely financed by debt? Actually, some of them sometimes are, as when the value of their assets collapses so that this comes down into line with, or even below, the book value of their debt. Think about the telephone and some media companies after the equity market falls of 2000 and 2001. Eventually, the brunt of the decline in the value of these businesses is borne by the bondholders as well as the shareholders. Ultimately, the value of the bonds becomes the result of a simple calculation of probabilities. How likely is the company to default, and what would be retrieved from the receivers if it did? The answer is generally that the shareholders get nothing and the bondholders lose a significant proportion of

their money. Liquidation at the hands of the receiver is rarely the best way to maximise the value of the assets of a business. Goodwill is irretrievably lost. So, as this situation looms, providers of capital get nervous. The value of both debt and equity diminishes. And the cost of capital to the company rises, where previously increasing debt reduced it.

Evidently, there is a happy medium, a theoretically optimal financial structure. Finding it is clearly difficult, and both it and the cash flows of companies are unpredictable and unstable. But managers are now more aware of the potential from operating a dynamic financial policy than they were, and this is particularly true in mature and capital-intensive industries. Fast growing industries need to conserve their cash, not pay it out. And asset-light industries have severe limits to how much money it is possible for them to borrow, as they offer less security. It is the desire to maintain flexibility that has underpinned the shift from dividends to share repurchases as a way of returning cash to shareholders. Dividends are perceived to be promissory, in a way that share repurchases are not.

Rebalancing of the balance sheet to optimise the use of debt is one thing. Returning a large proportion of your cash flows to the shareholder because you cannot find anything adequately profitable to do with it is another. All of the super majors have established a pattern of equity repurchasing. They are returning a fairly large proportion of their profits to shareholders and reinvesting a fairly small proportion in new assets. As already discussed, low levels of investment may result from either too high a hurdle rate or from a real shortage of investment opportunities. Investment opportunities have become a major factor in determining their relationships with counter-parties, notably governments. The single most important business relationship for a major oil company is that with its host government in the exploration and production part of its business, because this determines the extent of its investment opportunities.

It is notable that the situation for the private Russian oil companies is, in this respect, the reverse of that for the western companies. Like their western counterparts, the Russian companies have businesses that divide between old, low cost, cash generative assets and new, higher cost, investment opportunities. But the balance is different. The scale of the investment opportunities in

the Caspian region, in the Artic North, and in Eastern Siberia (all requiring substantial investment in transport infrastructure, not just field development) means that for the foreseeable future they will be capital hungry. It is an interesting paradox, and one that offers substantial rewards to the successful manager, that it is the companies with the better growth prospects whose assets are valued most lowly by the equity markets at the start of the millennium, and those with the least potential to add to the value of their existing assets whose assets are valued most highly by the capital markets.

3.4 Measuring Profitability

We have made a number of references to the problem with the use of accounting returns on capital in the oil industry, and of the confusion caused by the fact that oil companies comprise bundles of assets, some of which are worth a great deal and have a low balance sheet value, and some of which are probably not even worth their book carrying values, depending on how stringently accountancy ceiling tests have been applied. It is time for us to turn to this issue in more detail, since failure to treat it properly is, we believe, one of the more serious, but also one of the more easily remedied, problems for this generation of oil industry managers.

3.4.1 Why it matters

Oil companies are increasingly ranked, and probably priced, by investment analysts and investors on a basis that puts disproportionate emphasis on return on capital employed (ROCE). In addition, the return on capital that investors appear, anecdotally, to demand is significantly higher than the cost of capital to oil companies. Both of these factors have the effect of inhibiting investments that should be made under pure economic theory. Their impact is likely to be greater now that the largest investments, acquisitions of whole companies rather than individual assets, are increasingly to be accounted for using acquisition/goodwill accounting rather than merger/pooling accounting. We consider the cause of the present situation, analyse its effects, and consider possible corporate responses.

3.4.2 Causes of emphasis on ROCE

After a long period of uncertain response to the post 1986 oil price environment, the oil industry has undertaken a radical restructuring during the 1990s. This has taken on a number of related manifestations. Managements have realised that they must budget on the basis of flat oil prices, rather than relying on oil price inflation to justify their investments. They have accordingly found themselves confronted by cash flows that have exceeded the ability of the industry to reinvest profitably. The response has been consolidation and a rebalancing of balance sheets through share buy-backs. The parts of the business that have proved to be intractably overcapitalised, refining and marketing, have been the cause of or subject to huge horizontal mergers. And, last but not least, the communication process with the investment community has emphasised the efficient use of capital over all other managerial considerations. This has created a dangerous tendency for companies to use return on capital as their primary peer-group benchmark, and this has inevitably influenced the way in which they are perceived by investors.

3.4.3 The effects of emphasis on ROCE

There are two effects, both probably damaging, that have resulted from taking ROCE to be the ultimate arbiter of performance. One is easier to deal with than the other. The simpler of the two results from the fact that value is created by making as many investments, including acquisitions, as possible that return more than the cost of capital. It follows that overestimating the cost of capital will result in the company making fewer value adding investments than it should. The return on capital that it generates will be higher than it would be were it to optimise its investments. Its growth rate will be lower. And the overall effect on value will be to reduce the rate of value creation.

The second effect is subtler, and harder to convey to outsiders. Accounting returns on capital employed are not the same as economic internal rates of return. The reason is that depreciation is generally charged on a straight-line basis, or unit of production for upstream assets, which does not accurately reflect the rate of impairment of economic value during the life of the asset. This

is particularly true for long-lived assets, from which operating cash flow is likely to rise over the asset life, as is the case, for example, with gas pipelines, LNG terminals and electricity power stations. The opposite is the case for oil fields that often have a fairly short expected life.

This mismatch is illustrated in the simple example below (Figure 12), for a single five-year project, with no growth to the projected cash flows. It is therefore a misleadingly benign example, relative to most gas and power investments.

Year	0	1	2	3	4	5
Cash flow	-1000	300	300	300	300	300
IRR	15.2%					
NPV	1000	852	682	486	260	0
Economic depreciation		148	170	196	226	260
Economic profit		152	130	104	74	40
Economic ROCE		15.2%	15.2%	15.2%	15.2%	15.2%
Accounting depreciation		200	200	200	200	200
Accounting capital	1000	800	600	400	200	0
Accounting profit		100	100	100	100	100
Accounting ROCE		10.0%	12.5%	16.7%	25.0%	50.0%

Figure 12: Accounting and Economic Returns Differ

Source: BG Training

The example above relates to a single project. Companies have a portfolio of projects, which combine to generate their cash flows. So surely if a company had five assets, of varying ages, the accounting returns would equal the economic returns. Actually, there is no reason why this should happen. In the example above, a five-project company would generate a return on capital of 16.7 per cent. It is also important to note that as project lives get longer, or cash flows rise through the life of the project, the distortions become larger, with returns understated in early years and overstated in later years. Hence, growing companies tend to have understated returns on capital and mature companies tend to have overstated returns on capital, with lots of legacy assets.

It should be emphasised strongly at this point what point is not being made. Nothing in the paragraph above bears any relationship whatsoever to arguments about strategically attractive

investments, the option value associated with additional volumes or expansion of plants, or the importance of infrastructure to justify incremental investments. These points, coupled with fashionable ‘real option’ analysis, may well be worth considering, but they can easily be overvalued. Our argument is much simpler and much more important. It is that accounting returns on capital simply do not provide an adequate measure of the value that is being created by the company, even if all so-called strategic value is left out of consideration.

The error in equating accounting returns with economic returns is likely to be greatest in the case of corporate or major strategic acquisitions, as these tend to be big investments relative to the size of the acquiring company.

An acquisition is no different in principle from any other asset investment. The investor hopes to earn a return on the investment in excess of his cost of capital. Clearly, it is the full cost of the investment that is relevant to this calculation. But use of so-called ‘pooled accounting’ has permitted companies not to capitalise goodwill during the transaction. This has given a wholly misleading impression of its subsequent profitability, avoiding an apparent reduction in returns on capital. If figures for the latter in individual years are represented to investors as the arbiter of value creation then it is inevitable that companies will try to ensure that they are not seen to suffer as a result of acquisitions. Now that the mechanism of ‘pooled accounting’ has effectively disappeared, the effect may be to inhibit companies from undertaking large, value adding, acquisitions, simply because these might have a large negative impact on their accounting ratios. Thus a misleading valuation metric could result in seriously sub-optimal corporate decisions.

3.4.4 Appropriate corporate responses

We have seen that there are two costs resulting from abuse of ROCE. The first is that the benchmark tends to be set too high. And the second is that, even if the benchmark is correct, the difference between accounting depreciation and economic depreciation is such that a growing portfolio will tend to be unjustly penalised, and derided as uncompetitive. The same works in reverse. Companies that have under-invested for years can look

remarkably profitable. And this is not just a problem for external investors. It also distorts management thinking.

Most corporations undertake their investment decisions through the use of discounted cash flow techniques. This is particularly true in the capital-intensive and sophisticated energy sector. But once an investment has been made, it becomes increasingly difficult to benchmark its performance against an original cash flow budget. In addition, the unit of management that is being appraised generally has a number of projects under its management. It is generally required to produce management accounts, and will usually be judged on its meeting, or not meeting, profitability targets. Already, we are back in the world of profit and loss accounts and balance sheets.

One solution that is often presented is economic profit, or Economic Value Added, as trademarked by the US consultant, Stern Stewart. This has in its favour a blending of traditional accounting with the concept of a cost of capital. Businesses 'add value' if their return on capital is higher than their cost of capital. There are serious problems, however, with the application of this approach to assets with very different lives, as we have seen.

We would suggest that there are two factors that must be embedded in the process of capital allocation by all energy companies, and that they would benefit from making these understood by the financial community. The first is the relationship between growth, ROCE and value creation, and the second is the relationship between the duration of an asset's life and its accounting ROCE during its life. In addition, the most desirable method for coping with these issues internally may be different from that which can be used to communicate with investors.

3.5 Growth and ROCE

Assuming for a moment that accounting returns equated to economic returns, the second of our two problems disappears, but the first does not. In simple arithmetic, a no-growth company with a capital base of \$1 billion, which generates a return on capital of 15 per cent with a cost of capital of 10 per cent, will have a market value of \$1.5 billion. If the same company were to have the potential to grow its business, earning the same return on capital, at a rate of 5 per cent a year, it would have a value

of \$2 billion. But what if the effect of growing was to require it to accept less attractive projects, so that its rate of return fell to a constant 13 per cent? The resulting value is \$1.6 billion, still higher than the 'no growth' value. And at 12 per cent? The answer is \$1.4 billion, or less than the 'no growth' value. As we have seen, the relevant formula is that:

$$EV/CE = (ROCE - g) / (r - g)$$

Where EV is enterprise value, CE is book capital employed, ROCE is return on capital, g is growth rate, and r is the cost of capital.

Figure 13 illustrates the trade-offs for a group with a cost of capital of 10 per cent, and a range of different growth rates, assuming two alternative returns on capital employed, 12 per cent and 15 per cent. It shows that at growth rates of over 6 per cent, the firm with the lower return on capital will be worth more than the more profitable firm, if the latter does not grow.

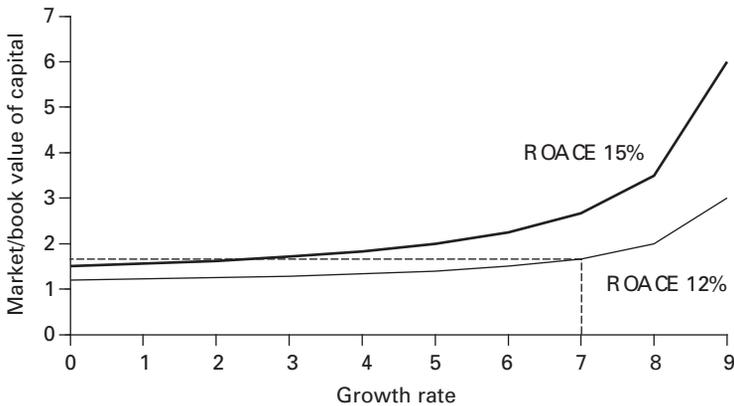


Figure 13: The Growth versus Return Trade-off

Source: BG Training

3.5.1 *Coping with duration*

We saw an example in the previous section of the difference between accounting and economic rates of return. There is no systematic mechanism for restating the former into line with the

latter. One approach that deals methodically with this problem is the valuation method championed by another firm of consultants, Holt (now a part of Credit Suisse First Boston) that is known as Cash Flow Return on Investment, or CFROI.

The principle of this approach is that a firm is seen as a series of cross-sections, each comprising an annual investment with an imputed average life. Since it is not possible from outside the firm, or usually practical from inside the firm, to track the performance of individual projects against original plan, the firm or business is instead analysed as a series of individual annual investments. This approach depends crucially on the asset life of the investments made inside the firm being consistent, in which case the firm can be modelled as one big project, based on aggregating historical gross investments, its current annual cash flow, and an eventual receipt of working capital. Its dependence on the assumption of a standard asset life for the business under review may render it insufficiently accurate for use internally by corporations (though it is an acceptable methodology for professional investors, many of whom do use it) and even internally it may represent an improvement on conventional management accounts.

Figure 14 illustrates the basic concept behind CFROI, using a firm whose asset life is three years, to keep the number of columns small. For transparency, it assumes that there is no inflation and that each year's capital expenditure has been identical with the last, and results in identical cash flows. It can be seen that the internal rate of return is the same when the three years are aggregated into a firm consolidation as when they are calculated separately. In reality, each annual IRR would be different, but the firm's CFROI would be calculated in the same way as below. The three back years' investments are aggregated. The current year's cash flow is assumed to repeat into the future over the asset life. And the back three years' worth of working capital is released at the end of the projected three years. Introducing inflation means that back capital expenditure has to be indexed, and makes more realistic the assumption of flat annual cash flow. The IRRs and CFROIs calculated are then real, not nominal.

3.6 Conclusion regarding Appropriate Responses

We have not attempted to synthesise the two approaches pre-

sented here, and they are intended to be schematic of possible approaches that oil companies might take to the assessment of performance and of valuation of companies, including their own, rather than to be a fully applicable blueprint. There are problems with both. The calculations relating returns on capital, growth, and value assume that there is a single applicable return on capital, which applies across the firm. The CFROI approach to performance has the big advantage that it escapes from the misleading effect of accounting for depreciation, and the big

Year	1	2	3	4	5	6
Year one capex						
Capital expenditure	-100					
Working capital acquired	-20			20		
Operating cash flow		50	50	50		
Free cash flow	-120	50	50	70		
IRR	18.4%					
Year two capex						
Capital expenditure		-110				
Working capital acquired		-25			25	
Operating cash flow			55	55	55	
Free cash flow		-135	55	55	80	
IRR		17.9%				
Year three capex						
Capital expenditure			-120			
Working capital acquired			-30			30
Operating cash flow				60	60	60
Free cash flow			-150	60	60	90
IRR			17.5%			
Firm at year three						
Capital expenditure			-330			
Working capital acquired			-75			75
Operating cash flow				165	165	165
Free cash flow			-405	165	165	240
IRR			17.9%			

Figure 14: CFROI Performance Model (\$ million)

Source: BG Training

disadvantage that it depends on the assumption of unchanging asset lives for each business unit being analysed.

What we do advocate is that companies should move to much more sophisticated thinking about their performance than is possible using simple ROCE targets, and that they should start to explain the issues underlying their thinking to the investment community. Failure to do this will result in inadequate investment, missed corporate opportunities, and sub-optimal growth and creation of value. But the accounting returns on capital employed would look terrific.

For the purposes of the analysis to be undertaken in this paper, we need to decide on a single methodology. We have decided to remain within the framework of economic profit, for three reasons. The first is that it is more directly calculable from figures in company reports and accounts, which should have the effect of making our analysis more transparent. The second is that, from the outside, the problems in establishing the useful life of assets, either new or existing assets, for an integrated oil company are daunting, even if the company is broken into its separate business streams. Finally, there is an important adjustment that can be made to the accounts of the larger integrated oil companies, which goes a long way towards addressing the main problem with using returns on accounting capital employed as a proxy for addition of value.

This choice should not be taken as definitive, however. The question of which methodology would work best in appraising and managing oil company performance remains wide open for more research.

3.7 Our Application of Economic Profit

3.7.1 McCormack and Vytheeswaran

We have based our methodology on one that was elaborated by two members of Stern Stewart, McCormack and Vytheeswaran, originally in a paper entitled, 'How to use EVA in the oil and gas industry' (*Journal of Applied Corporate Finance*, Volume 11, Number 3, 1998). We shall very briefly summarise their methodology, and then turn to an analysis of the world's larger private oil companies.

The simple formula that we used above to relate the market value of a company to its book value depended on the fact that if assets earn a return that is precisely what could reasonably be demanded of them, relative to their risk, then they should have a market value that equals their cost. If they earn less, then they should be worth less than their cost, and if more than more than their cost. But the problem with our formula was that it assumed that the company would achieve a constant return on capital. In reality, the returns that companies make on their capital employed change constantly.

Economic profit works by calculating the value that a company has added during a year as the difference between its net operating profit after taxation (NOPAT) and a charge, which represents its cost of capital times its invested capital. Thus, if a company's cost of capital is 10 per cent and it starts the year with capital employed of \$1 billion the first \$100 million of after tax profit that it generates merely justifies the money that has been sunk into it. What it earns over and above that figure adds value. One way to conceptualise this is to remember that the cost of debt is reflected as an interest charge in the profit and loss account, but there is no equivalent charge for equity. The return to the shareholder, net profit after taxation, is a residual, and there is no attempt in a conventional set of report and accounts to indicate whether or not it is adequate. By contrast, economic profit is struck after subtracting a fair return for both the debt-holder and the shareholder.

If accounts are rearranged in this fashion, there should be a close relationship between the economic profit that a company generates and the degree to which its market value exceeds its book value. The relationship is complicated, because markets discount the future, and the premium will reflect not just the return that a company has and is generating, but also that which it is expected to generate in future, and the amount of new capital on which this return is expected to be generated. However, in a mature industry, with long asset lives, the past should be a fairly good guide to the future, and one would intuitively expect a good correlation between generation of economic profit and increase in market value added.

3.7.2 Oil industry adjustments

McCormack and Vytheeswaran's starting point is that this correlation, for the oil industry, is poor. They comment that this is 'because the accounting information gathered and reported by oil and gas concerns does a distressingly poor job of conveying the true economic results of those firms in a timely and meaningful way. As a result, all accounting based measures, including a measure such as EVA that is derived from accounting information, have been ineffectual as meaningful goals, as decision tools, and as compensation benchmarks.' We think that they are right, which makes it alarming that managers and investors in the oil industry continue to set such store by these figures.

Their paper makes the point that the problem essentially lies in the upstream, exploration and production, part of the business. Properly applied to figures that do not include non-recurring stock gains and losses (using LIFO rather than FIFO profits) it is possible to use the economic profit method quite satisfactorily to assess the performance of refining, marketing and petrochemical businesses. The approach breaks down in the largest of most oil companies' businesses, exploration and production, and there are two main reasons for this.

The first reason is relatively easily fixed. It is that most large oil companies use an accounting convention known as 'successful efforts', whereby they capitalise only their successful wells and write off their unsuccessful ones. This seems prudent, until the thought occurs that it is no good making an adequate return on only part of the money spent exploring. The alternative approach, which capitalises all exploration whether successful or not, is known as 'full cost' accounting. Although unusual among the larger companies (and it is about to be phased out by the accounting regulators) it is desirable to restate their accounts from 'successful efforts' to 'full cost', when assessing profitability.

The second reason is extremely important, and much harder to address. It stems from the fact that the profit and loss account of an exploration company calculates profit as the difference between the value realised by selling oil and gas during the year, a stream of revenue, and the cost of producing these volumes, which take the form of cash operating costs, taxation, and depletion of fixed assets. But this ignores the fact that the

company may have found large amounts of oil during the year, which would have added significantly to its value, but would not have had any impact on its annual profit and loss account. The time lag between discovery and production in the upstream oil industry runs to years, and results in serious distortions between the timing of success or failure and its reflection in published financial statements. In addition, if oil prices rise then this presumably has an impact, not only on the value of oil sold during the year, but also on the value that the market should apply to the much larger volumes of reserves that are still in the ground, and which will only be produced in future years.

So what we want is to adjust the stated profit and loss account for the unrealised gains or losses in the exploration and production businesses that are not reflected in conventional accounts. As McCormack and Vytheeswaran point out, it is much easier to make the necessary adjustments from inside a company than from outside, but for those companies that are listed on the New York Stock Exchange, and are therefore required to file Report 10Ks (if they are US companies) or Report 20Fs (if they are non-US companies) it is possible to extract an approximation for the required figures from these filings.

Internal reporting has two advantages. It can respond immediately and fully to the best available information, and it can make use of sensible assumptions about prices and costs. Prices are crucial. Prompt oil prices are very much more volatile than forward oil prices, reflecting the fact that the market expects a reversion to the mean. It is not possible to sell all the barrels of oil in an oilfield on one day. Depletion takes years, or even decades. Moreover, if one were to sell the field to another company, that company would offer a sum based on its expectation of future prices, which would presumably bear some resemblance to the forward oil price curve. So, either way, the spot price is not what we want.

Unfortunately, if we are to work from publicly available data then we are restricted to the conventions that are required by the US Securities and Exchange Commission (SEC) when companies submit 'Supplemental information on oil and gas activities'. This requires oil companies to calculate the discounted present value of their oil and gas reserves, and to reconcile movements in value from one year to the next in terms of the effects of

changes in prices and costs, volumes produced, volumes added, accrual of the discount rate, and so on. This sounds ideal, but the assumptions that the SEC requires companies to apply are such as to undervalue significantly their reserves, relative to the value that the market would put on them. The methodology requires use of year-end prices and costs, restricts the calculation to proved reserves and requires application of a 10 per cent discount rate.

Market values would include some element for probable and possible reserves, would include a value for technical reserves, which have a negative net present value at current prices, and would make use of consensus forward prices and, possibly, a lower discount rate.

But it is preferable to make use of information, even if it is not ideal information, than to ignore it. Returning to McCormack and Vytheeswaran: ‘Of course, the proof is in the pudding...Whereas we found that the standard EVA_{1000} measure could explain only about 8% of the fluctuations in shareholder wealth for the 25 large firms, the adjusted $EVA_{O\&G}$ explains 49% of those movements. By comparison...popular accounting-based measures such as earnings, RONA [return on net assets], cash flow and EBITDA [earnings before interest, tax, depreciation and amortization] explained only 2% to 4% of MVA [market value added] perturbations.’

3.7.3 Our methodology

Broadly, we have followed McCormack and Vytheeswaran, though not with all of the adjustments that they would recommend. Our intention is to remain close to published figures, in the interest of keeping our analysis as transparent as possible. In all analysis, there tends to be a trade-off between accuracy and expediency.

In addition to the oil-related matters discussed above, there are some general accounting decisions that we have had to take, and on which our approach has been as follows. We have used USGAAP figures, rather than accounts prepared under local accounting conventions, throughout. We have also ignored all attempts by companies to identify non-recurring, or unusual, items. Without wanting to be contentious, we believe that some

companies have a much more optimistic notion of what constitutes an unusual item than others. We have left them all in, including gains or losses on disposals. Over a five-year period it is reasonable to assume that unusual items of all sorts should have occurred, and that there should be some statistical reversion to the mean. Where there is a stated difference between earnings on a FIFO basis and earnings on a LIFO basis, we have used the latter, even if this is not the primary reporting basis for the company. The corollary of a stock gain or loss is an offsetting increase or decrease in working capital, so LIFO profits give a better impression of underlying cash flow.

Goodwill is a much vexed question in discussions of profitability, as discussed above. We can see no case for using earnings after goodwill amortisation, since goodwill is not an asset that has to be replaced. In this respect, we are following the requirements imposed by the US Financial Accounting Standards Board (FASB) during 2001. Whether or not to include goodwill arising on acquisition in the calculation of capital employed is a more difficult question. If the objective is to assess how well management has invested shareholders' funds, then it should be included, since it has clearly been spent. If, on the other hand, the objective is to find out what return the company is earning when it invests in a new asset, then it is the return excluding goodwill that is required, since goodwill is not acquired every time an organic investment is made. (Returns including goodwill should also be analysed carefully since they will tend to look poor in early years and only be justified, or not, by subsequent growth.) In our methodology we eliminate goodwill from NOPAT and leave it fully in the figure for capital employed, whatever the treatment used by the company.

None of these adjustments relate to the issues discussed in the previous paragraphs, but the next ones do. We have substituted the 'SEC10' values for upstream oil and gas assets for their book values in our measures of the capital employed in the companies. And we have taken the net increase or decrease in these values, adjusted for amounts spent, as an unrealised gain or loss to be added to or subtracted from profit for the year. In other words, if a company has spent \$500 million on its exploration business and seen an increase in the value of its reserves of \$800 million during the year, for whatever reason, then we have taken the

difference of \$300 million to be an unrealised gain that should be reflected in the profit and loss account. We have not made the adjustment to 'successful efforts' referred to above, as the impact is relatively much smaller and the choice of depletion period for the expenditure is potentially contentious.

We have calculated returns on capital in three ways. The first takes accounting profit and divides it by accounting capital employed, subject to the adjustments listed above (LIFO, excluding goodwill). The second incorporates unrealised profits reflected in the 'SEC10' present values and relates these to a balance sheet that is adjusted into line with these values. The third is a hybrid. It takes the realised profits, and relates them to the adjusted balance sheet.

3.8 What Does it Mean?

The first of our three sets of numbers is a standardised version of what the companies stated. It reflects the lower oil price years of 1997 and 1998, and the boom of 1999 and 2000, and the subsequent decline of 2001, which was still a better than average year for the group. It supports the assessment of returns on capital in the mid-teens as being fairly average, and it represents a surprisingly, and misleadingly, stable view of value creation and destruction, during a period in which crude oil prices ranged from \$11 to \$30 a barrel.

The second of our series presents a much truer picture of value creation and destruction, albeit overstated by the convention of using flat year-end oil prices in the 'DCF10' calculations. What we see here is wild volatility, which is much closer to the behaviour of the market values of the companies. It is difficult, however, to calculate underlying average returns, since these are somewhat distorted by the size of the annual fluctuations, even if averaged over a five-year period, though we have partially corrected for this by using geometric as well as arithmetic averages.

The third of our series is an attempt to strip the main cause of volatility out of the second. We have used realised profits, excluding increases or decreases in the 'DCF10' value of the reserves, and divided this by opening balance sheets adjusted for reserves. These figures therefore represent the profit that has

been realised each year, as a return on the adjusted value of the capital employed at the start of the year.

3.9 Our Findings

3.9.1 The western super majors

The summary outcome of our analysis is shown in Figure 15. It is based on figures that we have aggregated for the five super majors. We are presenting the aggregates, rather than the individual company performances, for two reasons. The first is statistical. Five data-points do not represent as sound a basis for commentary as 25 data-points, and it is very possible that some of the differences between individual company performances are attributable either to statistical accident or to differences of accounting treatment, which are not all avoided merely by basing the numbers on USGAAP accounts. The second is that we believe that most of the important conclusions for the managers of the oil companies derive from the generic figures for the industry. Differences between companies, as measured in different ways, may be interesting, and may help to clarify areas of relative strength and weakness in a way that traditional accounting measures do not (we believe that for companies to analyse their investment options properly it is necessary for them to apply this methodology, or something like it, to their own and their competitors' activities, disaggregating the upstream from the other business lines), but we also believe that there are some very clear conclusions for the industry that emerge from the consolidate data, and that it is important not to lose them in the detail of inter-company comparisons.

First, the figures. Our analysis shows that the five super majors have generated accounting returns on capital over the past five years that average 12 per cent. This is based on their accounts using USGAAP figures, stated LIFO, and prior to goodwill, as discussed above. If we substitute DCF10 values for book values for upstream reserves, and include unrealised gains and losses in the value of reserves in our figures, then the average return falls to 9.5 per cent. The hybrid figure, using realised profits but based on fully valued balance sheets, results in a slightly higher figure, of 10.5 per cent. It is notable that the value of the reserve base

has grown quite considerably over the five years, by an annual average of 6.1 per cent. This is clearly rather faster than the rate at which reserves have grown in volumetric terms, and reflects an overall rise in prices. In other words, although the annual figures are very volatile the overall average has been pulled up by an increase in values driven by oil prices, which may not be sustainable. Thus, our estimates should be treated as maxima, and are probably not indicative of sustainable figures.

	1997	1998	1999	2000	2001	Average
<i>Book return on capital</i>						
NOPAT	35,560	18,257	25,900	57,650	43,810	36,236
Opening book capital employed including goodwill	248,506	258,487	267,086	351,233	351,538	295,370
Return on capital employed including goodwill	14.30%	7.10%	9.70%	16.40%	12.50%	12.00%
<i>Adjusted return on capital employed</i>						
Adjusted NOPAT	-37,867	-42,333	141,346	145,775	-109,907	19,403
Adjusted opening capital employed	294,191	277,023	225,033	424,443	511,146	346,367
Adjusted return on adjusted opening capital employed	-12.90%	-15.30%	62.80%	34.30%	-21.50%	9.50%
Realised profit/adjusted opening capital employed	12.10%	6.60%	11.50%	13.60%	8.60%	10.50%
Opening DCF value	174,820	151,282	95,947	216,178	329,029	180,810

Figure 15: Aggregate Returns for the Super Majors

Source: Antill and Arnott

3.9.2 *The private Russian companies*

Unfortunately, it is not possible to produce equivalent figures for the Russian companies, as a group and over a run of years, as comparable data are not available. Instead, we have been able to produce figures for the three largest of the Russian companies, Lukoil, Surgut and Yukos, for one year, 2000, which is clearly

rather a limited basis from which to extrapolate. Even then, Yukos has only started to publish DCF10 calculations for the year ended 2001, so we have had to carry back this figure for the previous period, which introduces an inevitable inaccuracy. That said, the result is extremely interesting.

In 2000, which was a wonderful year for the Russian oil companies, characterised by high oil prices and the benefit of the collapse of the Rouble over the previous two years, the combined return on accounting capital employed of the group was a remarkable 53.8 per cent. Substituting for the value of reserves both into the profit and loss account and into the balance sheet brings this figure down to 7.7 per cent, as a result of a substantial fall in the value of their reserves during the year, a contrast with the experience of the western super majors, perhaps largely reflecting the impact of rising production costs (due to inflation) during the year. The best basis for comparison may therefore be the hybrid figure, which adjusts the balance sheet but merely reflects realised profits. On this basis, the Russian companies achieved a 15.3 per cent return on capital in 2000, not far from the 13.6 per cent of the western oil companies.

Clearly, there are not enough data here to offer the grounds for confident conclusions. In any case, the factors driving the performance of the Russian companies are somewhat different from those driving the western companies. They have better opportunities for new investment, but much lower domestic sales prices and a fiscal regime that is uncertain and changing.

3.10 Implications for the Companies

3.10.1 The western super majors

From the viewpoint of the western companies, the main conclusion is that they are not making anything like 15 per cent returns on capital employed, if the capital is re-valued up to something closer to market value. This is as one would expect. An industry at equilibrium should be earning a fair return on the market value of its assets. Even a figure of 9 to 10 per cent is probably above the cost of capital to the industry (though this may simply mean that we are still underestimating the capital base). It is probable, but would require additional work to prove, that the

return on capital that the larger oil companies have generated over the past five years is in fact in the range of 8 to 9 per cent, and this would be consistent with their cost of capital.

Work recently published by Croll et al. (2001) relates to this. They have analysed the history of asset acquisitions by oil companies in the UK North Sea and among their conclusions is the result that on average these have yielded returns to investment of around '1% above the median nominal risk-free rate'. Clearly, this only applies to acquisitions rather than to all investments, but it is consistent with the broader analysis of this paper. This conclusion is not surprising, but it has strong consequences for the way in which the companies are managed, and for the nature of their communications with investors. For the former, it implies that they should be willing to undertake investments with lower internal rates of return than they appear to be demanding, with the result that they may be rejecting potentially attractive projects. It also implies that they may be misallocating capital between their businesses, favouring their upstream operations at least in part because of their tendency to overestimate its profitability.

For the latter, it implies that they would benefit from adjusting expectations downwards. The concept of a cost of capital is a circular one. It is the return that is embedded in current market values, the discount rate that the market is applying to future cash flows. Implicitly, investors are using the lower rate already. It could only help to make this explicit.

3.10.2 The private Russian companies

That the relevant information is not currently available for these companies in no sense alters the fact that this is how they need to think about their performance. In no meaningful sense, for example, was their return on capital employed really 50 per cent in 2000. If they are to increase the value of their capital as they expand, it will be as necessary for them to find a satisfactory methodology as for the western companies.

4. CONCLUSION

The management of oil and gas companies has the task of maximising the value of the company to its shareholders. The measurement of that value is critically important when judging the wisdom *ex ante* or the success *ex post* of the management decisions. In this paper we argued that the industry is in crisis because the promised growth in value is now out of line with the opportunity sets available. As a consequence companies must revisit the key issues of structure, profitability and growth if they are to differentiate themselves from their competition.

Oil companies are revisiting strategies to enlarge the opportunity sets, including de-integration, horizontal integration (retail), vertical integration (gas into power, banking), research and development (new products GTL, emulsions) or new countries (Russia, China). However, we believe that oil companies, and their investors, are in danger of being too theoretical where they need to be practical, and too practical where they need to be more theoretical. For example, we do not believe that investment strategy should be based on the premise that markets are perfect. Indeed, it is the existence of market imperfections that seems to us to offer companies the greatest scope for profitable growth. Excessive reliance on textbook economics needs to be replaced, we believe, by empirical attempts to establish where these opportunities lie; and an obvious starting point is to look for them within the existing company, and to try to quantify them.

But if companies seem to be being overly theoretical in their assumption of perfect markets when it comes to their strategic investment decisions, the opposite seems to be the case when it comes to the relationship between appraisal of new investments, management of assets once they have been acquired, and assessing the corporate performance which results from the aggregation of individual assets and businesses. Typically, discounted cash flow methodologies are used to justify investment decisions; managers are set targets in terms of operational and financial benchmarks; and then the performance and valuation of the overall group is seen in terms of consolidated returns on capital

employed and growth rates – with no mechanism to relate the three systems to one another. This is unnecessary, since finance theory now contains at least two effective mechanisms for relating discounted cash flow methodologies to accounting entities.

The two processes – measurement and business assessment – need to be undertaken together, since accurate measurement is required if the existing business is to be appraised with the intention of finding where value is really being added, and where the extent of the return is dependent on the business having certain attributes of shape.

The authors believe that there is a limit to what can be done usefully on the basis of publicly available accounting information, and that pursuit of this approach would need to be undertaken by individual companies, using the benefit of management information systems. The required stages would be, first, to establish a proprietary, integrated approach to valuation of investments and to performance measurement, and then to use it to try to establish where benefits, or costs, of integration actually lie. This is likely to be easier in some cases than in others. Differences in cost of debt between different companies are already externally measurable. Internal pricing arrangements to minimise taxation liabilities are not externally measurable – for very understandable reasons – but are probably already known to the companies concerned, as is their ability to achieve slightly higher margins in the event of their being able to influence prices throughout a supply chain.

Other consequences from integration or the lack of it are harder to quantify – higher propensity for technology transfer, for example, or the influence of a corporate profile on government agencies and its impact on the award of exploration and development licences. Importantly, it is in these awkward corners of the business, and not merely in driving down operating costs to a lower level than that achieved by almost identically structured peers, that we see the greatest potential for the integrated oil majors to differentiate themselves from one another, and to create opportunities for growth with returns that might exceed those offered by a completely commoditised business.

5. BIBLIOGRAPHY

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