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Multinationality in the oil and gas industry

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MULTINATIONALITY IN THE OIL AND GAS INDUSTRY

Dissertation

Degree of Master of Research (Management and Business Research Methods)

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ABSTRACT

This Masters Research offers uses new data analysis techniques to address intra-firm data segmented by business and geography for an industry specific set of firms. It tests whether oil and gas firms are global in their operations and hence sales to/revenues from consumers. Rugman and Verbeke (2004) suggest firms demonstrate a preference for local over global strategies when investing abroad and Rugman (2005) augments this theoretical position with industry level analysis and firm level case studies. They make a quantitative analysis of geographic revenue dispersion for 500 firms and find results supporting regional theories.

The analysis takes nine years of data as a longitudinal panel data set that offers, for the first time, trend data analysis into the debate around global versus local strategies. Corporate finance theory informs selection of performance proxies that recover 'missing' observations but high regional focus in revenues is again found in the numerical majority of firms. 67% of weighted total firm revenue for FY2008 is intra-regional, as suggested by Rugman (2005).

This extended data now shows new global and bi-regional cases, a variation in comparative global focus across the value chain for the largest oil and gas firms and movement away from home country and region. Modelling using this new data shows no support for the existence of multiple-order regression equations linking regionalism to firm performance. No correlation is found between oil price, performance and multi-nationality for these firms but there is an inverse correlation between multi-nationality and revenue. This suggests that extant theories of decreased performance against increased scale are not evidenced in this specific industry and hence suggests that both size and history do matter.

Keywords: Regionalism; Internationalization; Petroleum; Multi-nationality; Performance

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ACKNOWLEDGEMENTS

GLOSSARY OF TERMS

Method

10-K	Annual filing to United States SEC by US domiciled firms
20-F	Annual filing to United States SEC by non-US domiciled firms with US ADRs
ADR	American Depository Receipt, form of US based shareholding in non US-firms
COMPUSTAT	S&P Online Database of Company Reported Data
EDGAR	SEC Online Database of Company Filings
EJV	Equity Joint Venture
EPR	Energy, Petroleum and Refinery as category in S&P Data and Rugman (2005) analysis
F/T	Foreign Sales over Total Sales (also as 'FSTS')
FATA	Foreign Assets over Total Assets (also as 'F/T')
FDI	Foreign Direct Investment can be shown as 'dfi' within certain academic circles
FSA	Firm Specific Advantage
FETE	Foreign Employees over Total Employees
FSTS	Foreign Sales over Total Sales (also as 'F/T')
FY2xxx	Financial Year, generally as calendar year unless otherwise stated
G-500	Fortune Global 500 list of the highest revenue private companies in the world
LOB	Line of Business (also as 'Business Segment')
M: P	Multi-Nationality and Performance statistical regression analysis
Platts	S&P provided database of oil and gas industry specific information
R/T	Regional Sales over Total Sales
ROA	Return on Assets
ROCE	Return on Capital Employed
ROE	Return on Equity
ROR	Rest of Region construct for home region revenues excluding home country element
ROS	Return on Sales
ROW	Rest of World construct for extra-host region revenues
S-10	Ten firm sample used in this analysis selected primarily by position in Revenue list
S-31	31 (now 29) firms from the original Rugman (2005) analysis
S-102	102 firms used as the initial sample of the largest oil and gas sector firms
S&P	Standard and Poor's
SEC	United States of America Securities and Exchange Commission

Geographic

AF	Sub-region/zone as continental Africa and includes Mediterranean countries as Libya
AP	Asia-Pacific region of Japan, China, Middle East, Africa, India, Russia and Oceania
CIS	Commonwealth of Independent States (also as 'NIS', Newly Independent States)
EU	Europe region of EEC with Baltic, Balkan and western ex-CIS states
LA	Latin America sub-region covering South American and Central American states
ME	Middle East sub-region/zone covering Arabian states
NA	North America region covering US, Mexico, Canada and the Latin America sub-region
OC	Oceania sub-region covering primarily Australia and New Zealand with Indonesia

Industry

BOE	Barrel of Oil Equivalent
Downstream	Economic concept for supply chain receiving resources for intermediate production *and also* Oil industry generic name for Refining and Marketing business segment
E&P	Exploration and Production (also as 'Upstream')
FAOI	Finance and Operating Information
GTL	Gas-to-Liquids conversion technique for bulk transportation of gas products
NGL	Natural Gas Liquids
Operator	Governance structure of EJV identifies one partner as lead delivery organisation
PSA	Production Sharing Agreement
R&M	Refining and Marketing (also as 'Downstream')
RDS	Royal Dutch Shell plc
RRR	Reserve Replacement Ratio
Upstream	Economic concept for supply chain feeding resources to intermediate production *and also* Oil industry generic name for Exploration and Production business segment

Economic

CSA	Country Specific Advantage
CSR	Corporate Social Responsibility
FDI	Foreign Direct Investment
FSA	Firm Specific Advantage
Internalisation	Principle of monopoly advantages for MNEs gained through ownership
MNE	Multi-National Enterprise
OLI	Ownership – Location – Internalisation (also as the Dunning 'Eclectic Paradigm')
WHO	Wholly Owned Operation/Organisation

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CHAPTER ONE: AIMS AND OBJECTIVES

Introduction

Globalisation is a widely discussed socio-political concept and there is extended debate over its economic and business impact. Friedman (2005) highlights for example borderless trade of products and services with decreasing location specificity in production facilities. Ghemawat (2003) argues instead for 'semi-globalisation' and suggests a slower transition towards an exchange based society that retains cultural and administrative boundaries.

Trade economists highlight perceived shifts towards global markets, as shown by the foreign investment patterns of firms seeking larger sales volumes and increased returns through economies of scale in production and scope. Foreign direct investment (FDI) is undertaken by firms of many sizes but the foreign assets of the largest 100 Multi-National Enterprises (MNE) accounted for 46% of total outward stock of FDI in 2004 (UNCTAD, 2005).

MNEs are a significant factor in economic globalisation but the welfare implications of this influence is debated widely, for example as Penrose (1968) highlights as monopolistic oil firms in Persia (Iraq). Hymer (1976) suggests profit maximisation in MNEs also drives monopolistic action as evidenced by their comparative dominance of many foreign markets.

Rugman and Verbeke (2004) offer empirical analysis of the extent of the multi-national spread of firms using the reported locations of revenues from product sales as their independent variable. They find a strong home region bias in the strategies of the world's largest firms, counter to views of wider global operations. Reviewing this work six years later offers opportunities for longitudinal perspective to repeat and advance the original empirical Rugman (2005) study with industry specific analysis of public secondary data.

Research Question

The research question is "Do oil and gas industry firms demonstrate an increased global focus in their sales over time?" This research is based on the hypothesis that the Rugman (2005) findings for all industries and the numerical majority of oil firms are correct but that there are latent secondary effects hidden in the data sample and masked by the analysis method. The Rugman (2005) analysis has missing data which affects the results, so this revised method will now verify the extent of home focus, or otherwise, in this industry.

The unit of analysis is oil and gas firms, identified as the largest c. 100 firms in this sector, sub-divided to three groups as exploration, refining and integrated companies. This includes the same oil firms as Rugman (2005) but for the first time extends the data analysis over time, in depth of business detail and by number and accuracy of observations to test the research across what is in effect the 'whole' industry at 97% of reported revenues. Most state oil companies (e.g. Saudi Aramco) are excluded because they are operating under national rather than commercial strategies. They do not feature in the S&P Global Fortune 500 data set, which was the unit of analysis for the Rugman (2005) work.

The null hypothesis predicts no significant global results found and sees instead a regional bias in the aggregate revenue data for the sample. General literature review in Chapter Two finds that certain oil firms have operated globally for many years. This leads to a secondary hypothesis that there may be markedly different extents and effects of multi-nationality across of the oil firm value chain. If this can be tested and found then it represents a new contribution to knowledge. This perspective is termed 'multi-layer' firm level analysis. And implies different operating strategies may exist within (large) firms. This suggests a research agenda addressing strategy-as-practice implications but again this is out of scope herein.

Research Focus

This research extends Rugman (2005) with an industry specific empirical assessment of multi-nationality by revenues in the largest one hundred non-state oil and gas firms. Collection and analysis of intra-firm, publicly reported secondary data will show whether the high regional focus Rugman and Verbeke (2004, 2007) identify is evidenced in this industry. Retaining a similarly positivist perspective as these authors, it adopts the Popper (1959) principle of falsification that suggests theory cannot be proven categorically but it can be disproven and if refuted then alternative theory should be advanced.

The main research question will address whether the investment patterns of firms, measured by the revenue distribution from operations demonstrates common global focus across trading regions. Theoretical literature previously treated this simply as vertical and horizontal integration. Changes such as electronic trading; nation states restricting profit for foreign oil firms and the emergence of both resource hungry and resource heavy, newly-industrialised countries mean historical trading patterns have changed. As a result there are historic factors such as the post-war strength of the United States of America that have precluded the development of a competitive, welfare maximising industry (Casson, 2010).

The main issue addressed here is whether globalisation describes the investment strategies of MNEs. This Masters Research takes the Rugman (2005) conclusion that intra-regional strategies dominate over global activity. It suggests this is only a partial explanation for the industry and that legacy endowment of monopoly rents and the structural effects of long-term oligopolistic competition are also important. These parameters are however hard to operationalise and hence are omitted in multi-nationality and performance analyses in the literature in favour of more readily available, large number but low validity data sets.

Research Approach

Testing of multi-nationality against accounting or other market metrics (denoted 'M: P') is an established field in International Business (IB) studies. Such firm level analyses require either large sample populations to mitigate industry-specific effects or a narrower view with a granular analysis of the operations of firms within one sector to thence control for industry effects. This form of analysis is the starting point both here and at doctoral level.

Empirical analysis of the S&P Global Fortune 500 (G-500) – starting from Rugman and Verbeke (2004) suggests that most large firms operate primarily in their own, home region based on sales revenues and geographic consumption data. Rugman and Oh (2010) extend this analysis using both revenue and asset data. They test the correlation of regional constructs with performance measures such Tobin's Q alongside traditional accounting models such as ROA, ROS, ROE and ROCE.

Asrilhant, Meadows and Dyson (2004) describe the oil industry as capital intensive, technology oriented and infrastructure focused. It also demonstrates longitudinal continuity for a set of dominant firms (BP, Shell, ExxonMobil, Chevron and Total). For these reasons is chosen as the industry of focus but a holistic industry sample (>800 firms) is too large to operationalise for Masters Research so the analyses here use fewer cases to test research methods. However it does include firms of all regions and always retains the 'Majors'.

Marschan-Piekkari and Welch (2004) suggest 80% of IB articles use quantitative over qualitative research approaches. 'Mixed' methods using case analysis and interview here could provide primary data on the 'how' and 'why' of internationalisation. Such strategy analysis is however hard to operate as access to suitable numbers of cases is hard to gain.

The research philosophy adopted here then is deductive and uses quantitative analysis. It advances theory by testing the hypothesis that globalism is not evidenced in oil and gas firms and the counter-view if the null hypothesis is delivered that other factors are equally as important as regional and global distributions. This advances the Rugman (2005) analysis by extending the size of one industry sample three fold and with greater depth.

It also builds on Rugman and Oh (2010) with inductive findings through regression analysis of regional scope (independent variable) on performance (dependent). It shows that these analyses are limited in their descriptive power. Industry factors such as oil price are also found to be unimportant to relative performance and the final chapter suggests a research agenda that instead focuses on what has and will shape the industry and its welfare effect.

Ethical Considerations

A key aspect of any research process is its ethical validity. This addresses both concern for the safety and confidentiality of individuals but also standards for the conduct and accuracy of research results. The data collection and analysis here does not involve human subjects and as there is no primary data collection technique such as interview used there are no significant personal ethical issues in terms of confidentiality, safety or anonymity.

The methodology selected here uses only public domain secondary data sources such as company filings to the US SEC. The analysis is thence verifiable and entirely replicable and meets this first criterion for good research practice (Hammersley, 2007). The sources used involve company reported data intended for investors as well as regulatory bodies. The data is thence open to some commercial bias and in particular differences in interpretation and application of international accounting standards remain an ongoing business issue.

The main ethical issue concerns the use of database sources in data collection. The research would have used S&P 'Compustat' but financial constraints precluded this. The resultant laborious and potentially error-prone manual entry to spreadsheets from company reports as opposed to automated extraction of data meant that the number of firms addressed and the breadth of research has had to be reduced to balance the data collection burden.

Unofficial access to Compustat was available and could have allowed generation of more data but this would have been a breach of copyright and hence was ethically unacceptable. Arranging fee-paying visiting researcher access at an accredited institution will overcome this issue for the larger data collection in the future doctoral research work.

There was a potential bias in the analysis given existing practitioner knowledge from the industry but using quantitative methods and secondary data mitigates this risk. Retained financial interest in the oil industry, including share awards within firms in the sample, does not prejudice impartiality the in findings. Industry specific data came from the Oxford Institute for Energy Studies, which has charitable status and is within Oxford University but is funded through industry bodies such as the oil firms so might be construed to be partial.

Summary

The rationale for conducting the research is that more reliable, granular firm-level data is now available due to changes in regulatory requirements over the last ten years. It is an empirical contribution that seeks to both to replicate existing material and also add a new tier to the analysis. Data on the scale and extent of individual firm operations at a geographic and business unit level are now accessible and hence can better validate and inform the theories of regional strategy, here on a case-by-case basis.

CHAPTER TWO: RELEVANT LITERATURE

This chapter addresses the theoretical basis for internationalisation of operations by firms and also briefly describes the history and structure of the oil industry. Thereafter the discussion concentrates downwards successively as general description of multi-nationality and performance; more detailed review of the quantitative methods in this field and finally focuses on the main empirical contribution (Rugman, 2005) as the basis for this research.

Location-Based Theories of the Multinational Enterprise

Caves (1971) suggested certain industries offer opportunities for above-normal profits due to higher barriers of entry and hence limited opportunities for external capital investment. He categorises foreign investments as either horizontal or vertical integrations. Caves also notes (1971, p. 12) that industries such as the US petroleum industry are characterised by localised demand through transportation constraints and significant barriers to entry for new suppliers. This leads to oligopolistic, imperfect markets and he suggests that 'regional sub-markets' are a logical response to these constraints.

Maintenance of oligopolistic profits and responses to home market competition are other rationales for Internationalization strategies. Buckley and Casson (1976) suggest a tipping point in research intensive industries from aggressive expansion at the end of WWII that moved towards a second, defensive phase. Cibin and Grant (1996) and Weston *et al* (1999) address this change in qualitative, case based terms for oil and gas firms showing how the industry has consolidated. However, quantitative approaches to such industry analyses remain rare. Casson (1986) and Hennart (2007) both note a lack of effective empirical testing of the theories of vertical integration and multi-nationality across the literature.

Caves (1971) uses the economic concept of knowledge as a 'public good' and suggests that there needs only to be a net cost benefit to the deployment of proprietary knowledge by a firm in a different location to justify foreign direct investment (FDI). He suggests that firms are unique and possess knowledge assets in terms of managerial capabilities; technological innovation and intangible assets such as brand and product recognition levels that combine to give unique Firm Specific Advantages (FSA).

FSAs are usually as proprietary knowledge skills and Buckley and Casson (1976) give them as the reason why establishing overseas operations is preferable to simple export or licensing. This view is termed Internalization Theory and suggests ownership of assets offers reduced risk when exchange is contract based. Typical oil and gas sector risks include the asset appropriation from firms in the Middle East, Libya and India since 1945 (Chaudhry, 1977).

The Constructs of Multi-Nationality and Performance

Schmalensee (1985) initiates a study of industry and firm level data suggesting that industry effects were the dominant factor in firm performance. Rummelt (1991) extends this analysis and finds that the original Schmalensee work was robust but restricted to a single year (1975) so did not address the full business cycle. He suggests that the Schmalensee findings were better explained by a discussion of business unit effects inside the firms.

McGahan and Porter (1997) extend the debate again, using a greater level of data and better statistical methods to deepen the analysis. They compare business unit, industry and corporate-parent effects. They discount year specific impacts but find that Schmlansee and Rummelt were over-generalising their conclusions as industry effect is a highly specific variable with major impact in single industry firms but less effect for a diversified corporate.

Osegowitsch (2003) links organisation integration, degrees of multi-nationality and the comparative performance of firms. His premise is that integration is the mechanism by which multi-nationality is translated by MNEs into improved economic performance. He tests this empirically using survey based data and this analysis of professional engineering companies is useful a credible comparator for the high technological focus of the oil firms.

Low levels of change in the oil industry have made it one of the most stable business sectors. The majors were mostly formed over 100 years ago and offer scope for longitudinal and cross-sectional analysis. Buckley and Casson (1976) suggest that oil was a multinational dominated industry before the last World War. Adelman (1983) highlights the competitive history of the industry, which had operated as a global cartel even after the Sherman Act legislation of 1911 that saw the break-up of Standard Oil in the US. He noted in particular the principles of vertical integration as a technique for achieving certainty of supply.

Van Lear (1989) describes the effects of OPEC and oil supply constriction that drove large scale reconfiguration and consolidation among the oil firms. Weston *et al* (1999) provide detailed review of merger activity in the industry and use Herfindahl Indexes to suggest that recent concentration activity, whilst financial large in scale, has left the industry in a fragmented state. However, such analyses are insufficiently focused and unable to detect localised, country or regional monopolistic structures.

The data presented in Chapter Four below highlights disparities between closed and competitive economies and the multi-nationality debate is relevant for the oil industry. Much of the world's recoverable oil is in Africa; Russia and South America and now gas from Oceania and the Middle East. These zones are less integrated elements of the Triad model and incorporating these geopolitical factors drives the data analysis and method.

Ollinger (1993) presents a qualitative longitudinal case analysis of the US oil industry suggesting that organisational form was driven by strategic considerations. He concludes that the scope of the multi-divisional firm is constrained by the transferability of FSAs (skills) and that the capital markets have a high impact on industry configuration. Agee (1994) deconstructs this analysis and highlights the limitations of the performance measures Ollinger applied, in particular the lack of relevance of Tobin's Q to this industry. Lamont (1997) takes a rigorous quantitative approach in analysis of diversification activities of oil firms and find that these investments are irrelevant to long term industry structures when comparing capital investment choices by these firms in the mid-1990s.

Industry and Financial Measures of Firm Performance

A methodological concern with defining the extent of multi-nationality or regional diversity is the complexity in defining the comparative performance of geographically and operationally disparate firms. Constructs such as Tobin's Q are prone to variances in reporting standards. Another proposed proxy for performance is market share in a specific market, but gaining accurate data is more complex. There are agency issues in market entry by large oil and gas firms that may not fully align with rational action (Jensen, 1986).

Meta-analysis by Bausch and Krist (2007) concludes that there are significant gaps in methods. They propose that there may be as yet undiscovered moderator-variables that affect the multi-nationality: performance relationship listing research intensity, product diversification, country of origin, firm age, and firm size as likely factors. They suggest (2007, p. 341) that other moderators such as industry context and the extent of competition should also be investigated and this research adopts that suggestion.

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Quantifying performance is a complex issue that has not been satisfactorily resolved in M: P studies. Lu and Beamish (2004) use return on assets (ROA) and Tobin's Q but note debate over the efficacy of both these measures. Bausch and Krist (2007) summarise the current M: P research by suggesting that there is no single outcome or consistent trend in the discussion and hence no 'one fits all' solution. This paper instead argues for using new, industry-specific performance measures and will detail these in Chapter Four.

Globalisation in the Oil and Gas Firms

Al-Obaidan and Scully (1995) is the only identified contribution to address multi-nationality and performance in the oil sector. Methodology issues therein around the selection of data on performance, especially the scope limitation to refinery operations alone, mean that the outcomes are harder to generalise at the full industry level with integrated operations.

Nonetheless, the idea that multi-nationality and an estimation of efficiency and scale impacts can be balanced against measurable values for the changes in business risk presents a useful research design. Barrera-Rey (1995) addresses vertical integration in the oil industry and introduced cost related measures that address the negative implications of vertical integration. He suggests that '...the measure of costs of integration should reflect the effects of slack, diseconomies of size and diseconomies of diversification...'.

Arnott and Antill (2004) address the international operations of oil firms, highlighting the segmented elements of the theoretically 'integrated' Super-Majors. Their positioning of advantages in firm size mirrors what Internalization Theory suggests and also is reflected in their revised set of performance parameters that better define the operations of firms. They conclude by suggesting that *un*-integrated operation now describes the largest oil firms.

This changes the previous perception of vertical integration suggested by Armour and Teece (1978) and seen as the dominant economic model for the oil industry. Factors in this change include greater transportation and exchange opportunities between firms and locations such as technological advances as Gas-To-Liquids (GTL) and a realisation in firms that the upstream supply of crude oil(s) is better made as an open market transaction than with a proprietary, ownership model in order to ensure supply to the downstream operation.

Davis (2006) provides parsimonious description of this industry level change from a global dominance by the oil majors to more localised dominance by regional states. He suggests a shift from a 'control of supply' to a 'core competence and competition' mindset in the oil firms. This replaces the vertical integration model first suggested by Stigler (1951) and detailed by Casson (1986) as the method used by firms to internalise supply restrictions.

Arnott and Antill (2004) note an increasing dominance of the 'Super-Majors' and suggest that other factors must explain the increased profits and overall performance of the largest integrated operations. They offer 12 factors that firms can utilise through ownership advantages as suggested by the Eclectic Paradigm (OLI) model of Dunning (1980) and Internalization Theory (Buckley and Casson, 1976).

These factors are either FSAs or relate to CSAs (Country Specific Advantages) and include trading advantages inside firms to reduce information and search costs; technology transfer between business units as proprietary knowledge which offers firm specific technical solutions (e.g. deep-water drilling[1]) and economies of scale in terms of increased brand awareness via sponsorship deals (e.g. Shell-Ferrari in support of premium fuel).

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[1] *The validity of this idea may require some review following the recent BP/Gulf of Mexico disaster which occurred during the research (2010) but is retained to reflect the ongoing dynamic of 'theory' against 'reality'*

Financial capital power is another FSA and manifests itself through lower cost of borrowing for capital expenditure projects; by offering opportunities for risk-aggregation and capital diversification within firms and through simple 'staying power' for firms with high revenues. The effects of this financial gigantism are evidenced in Chapter Four and include the ability of the global oil firms to profit from trading oil through scale control and volumes.

Quantitative Analysis of Location Theories

Rugman and Verbeke (2004) in theoretical terms and Rugman (2005) with empirical results and case studies demonstrate that 'regional' is the best description for the strategies and hence operations of the world's largest firms. This counters views in sociology and strategy literature, such as those of Giddens (1999) and Friedman (2005), who suggest society is increasingly globalised and that the international trade of firms is a key factor.

Rugman and Verbeke (2004) identify a dominant home region bias in the trading operations of firms taking the Fortune Global 500 firms as their unit of analysis and individual firms as their unit of observation. Defining four types of firm strategy – focus on home region (D), bi-regional (B), host region (S) and fully global focus (G) – they derive results showing a strong emphasis on home region strategy and limited global focus.

The key finding is that 320 of 380 firms have a home region bias where data was available (2005, Table 1.2) and there were only 9 global firms. Rugman and Verbeke (2004) suggest the strong home region bias identified is explained in FSAs such as technological expertise, brand recognition and access to investment capital linked with CSAs such as natural resource endowments and high labour availability. These links offer monopolistic profits largely through economies of scale and scope – but only in home markets and not globally.

The global constraint for MNEs in Internationalisation is a 'liability of foreignness' which Hymer (1976) suggests demonstrates some form of welfare loss has arisen if foreign firms can overcome this comparative disadvantage and still generate profits overseas. Foreign MNEs will face cultural and logistic issues that local firms do not experience and thus local firms should always have price and local responsiveness advantages over foreign entrants.

Rugman and Verbeke (2007) define this as a liability of 'regional foreignness' which leads firms to use the home-country and home-region as proving grounds for their product development prior to overseas market expansion. This implies firms learning and parallels the incremental view of internationalization (Johansen and Vahlne (1977, 1990)), with location specificity rather than internalisation of market imperfections as the primary driver of firm strategy and which adds a cultural and physical proximity into the strategic mix.

Rugman and Verbeke (2004) address products and/or services revenue, echoing Levitt (1983) that globalisation is evidenced by increasing homogeneity of products and markets. The main empirical contribution of the Rugman and Verbeke (2004) analysis is in re-defining multi-nationality in regional terms as NA/T, EU/T and AP/T, enhancing the accuracy of the usual multi-nationality construct of F/T or FSTS (F = Foreign Sales over T = Total Sales) with a Home region construct denoted as R/T (R = Regional Sales over T = Total Sales).

Later analyses (Rugman and Oh (2010)) also address asset dispersion and use firm asset valuation data to test a Foreign Assets over Total Assets (FATA) construct similar to FSTS. Such asset dispersions and equally employee counts (FETE) are used in trans-nationality indices for the location aspects theories of FDI. These asset and employee data studies find comparable or even higher levels of home regionalisation as the revenue focussed studies.

Rugman (2005) uses country of consumption to allocate the sales revenue of the firms against the Ohmae (1985) Triad locations of United States, Europe and Japan but interpolated into NA (Americas), EU (Europe) and AP (Asia-Pacific) to reflect geopolitical changes such as the NAFTA and ASEAN trade agreements. FSAs have location bounded characteristics, such as localised brand relevance, that preclude their deployment outside of the home country of a firm. Non-location bounded FSAs include firm proprietary knowledge, such as patented technology that is essentially 'virtual' and not location specific. The data supports this with seven technology firms found in their nine global firms (2005, Table 2.2).

Discussion of the Approach

Rugman (2005) addresses gross revenue as the predictive variable without having to consider whether this value was generated by licensing, export sales or FDI nor whether the mode of entry into other countries was in the form of localised production capabilities, either through equity joint venture (EJV) or wholly owned subsidiaries (WHO).

Aharoni (2006) notes different consumption profiles for products and suggests there may be global and less-global sectors and products. He identifies crude oil specifically as an example of a global product and this links back to Ohmae (1985) who had proposed taking an equal strategic focus and equal sales in all regions for firms through standardised product design.

Dunning, Fujita and Yakova (2006) suggest that country rather than firm level considerations dominate strategy and that Gross Domestic Product (GDP) at the country level drives contingent strategies for firms when they internationalise. This view is encapsulated in the debate whether FSAs can exist endogenously in the long term or whether FSAs eventually become exogenous to the firm and hence appropriable for other firms.

Rugman (2005, p. 7) discusses 'front end' sales and 'back end' production and suggests that upstream production may transplant overseas more easily than locally focused downstream sales. Casson (1984) in analysing vertical integration also differentiates between these 'upstream' and 'downstream' production stages. Oil firms show markedly different levels of return and capital investment across different segments and this correlates with theories of FDI as natural resource seeking, asset seeking or market seeking investments[2].

Summary

This Masters Research addresses the firm level rather than industry level and tests the relation between multi-nationality, organisation and performance. It carries out analysis of business unit data, as with Rummelt (1991) but with oil and gas firms as unit of observation cross-industry effects are hence negated. The analysis follows the broad research design of Rugman and Verbeke (2004) but by developing new performance models and building a longitudinal panel data set it takes a more granular view than the prior empirical work.

The approach to international expansion that firms overall and business units individually take varies and theories of profit maximisation, as suggested by Internalization Theory, are thought to apply and these are tested by a falsification hypothesis. The contribution to knowledge will be showing that there are 'companies within companies' inside oil firms that exhibit heterogeneous approaches to globalisation strategies in their foreign investments.

It will also allow research at the doctoral level on the strategic implications of these different strategies within firms. This in turn allows discussion of the welfare implications in the dominance of firms from a perspective of Corporate Social Responsibility and addresses concerns over economic development of sustainable and renewable energy sources.

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[2] *'Upstream' and 'Downstream' have economics and oil industry meanings but these are here broadly comparable terms*

CHAPTER THREE: DATA SOURCES, COLLECTION AND ANALYSIS

The Nature of the Data

The oil firms are today as significant a component of the S&P Global Fortune 500 (G-500) in terms of revenue as in 2001 and are the largest constituent population with 49 entries in FY2008. ExxonMobil, Royal Dutch Shell (RDS), BP and Chevron are four of the world's largest five firms with $1.5 trillion in revenues but were unclassified or incomplete in the Rugman (2005) analysis due to missing data. This research follows the same quantitative methods as Rugman (2005) but better models the regional operations and performance of the oil firms in more production based terms to recreate these missing observations.

There is increasing granularity in firm secondary data around these product elements but this layered data has not been used widely in the empirical work or literature. Firm business segments (also termed 'Lines of Business', LOB) are clearly delineated by nature of the activity, sufficiently asset based and heterogeneous that longitudinal, panel data can be generated for firm regional revenues by segment. This increases the number and accuracy of observations, as much as six-fold in some cases, dependent on the reporting structures adopted by firms. Importantly it also allows the 'recovery' of missing data from earlier years.

Additional data however brings complications of increased analysis time. Studies in this area have addressed employee counts; asset dispersion and some profit (earnings) analysis. The greater depth of LOB data on revenue however is not mirrored in asset or employee counts and thus these design options are rejected. Post-viva addressing tax payments and in particular country level tax contributions is a possible new research approach for better defining multi-nationality but was not operated as part of this Masters Research work.

Rugman (2005) used firm annual reports but only addressed summary level information in firm statements of regional revenues. In many cases these are not given and thence some of the world's largest firms were excluded. No derivation of regional revenues was possible and no retrospective addition to the sample has been attempted in later work. The definitions of 'region' also varied so Rugman (2005) needed extensive notes and these construct had consistency limitations that would reduce possible comparisons over time.

Further, home bias was perhaps overly represented and skewed the analysis of the original data on operating revenues. Local firms will report less complex data than for global firms that have multiple operating companies and multiple product lines of business. Hence local firms would feature more often in a sample based solely on reported secondary data. The opportunities to address this issue in the Rugman (2005) work were limited due to the sample breadth (500 firms) but can be resolved in this narrower, industry based version.

Three factors are relevant for the oil firms to resolve these reporting limitations. Oil is a 'global' commodity with a homogeneous specification for regulatory and environmental reasons and this allows easier comparison of data. Oil and gas is a stable industrial sector characterised by long-term investments, such as refineries and production facilities. This high asset-specificity allows extrapolation of supply and demand for years and regions. Finally the price of oil is a worldwide standard with global trading markets determining the price of crude oil, intermediate and finished products and thus firms are largely price takers.

In summary, better access to and fuller analysis of the production based aspects of oil firm operations (volumes), moderated by price variations between products and geographical allocation by production and refining location gives revenue data for firms with much fuller and more verifiable detail and now offers the opportunity to generate longitudinal data.

The Sources of Data

Statistical approaches to research carry some specific design considerations in terms of what Bryman and Bell (1993) define as issues of reliability, verifiability and replicability. A key issue is sample size for the proposed analysis methods. The 49 oil firms listed in G-500 would give a sufficiently large sample to answer for the research question. However, some of these firms do not present enough public domain data so the sample is extended into the Platts 250 industry listing of the largest oil and gas firms by revenue and primary activity.

This gives 94 firms (as Appendix Two) with enough variety from a geographic and line of business perspective to represent the Triad region model and with a balance of exploration, refining and integrated firms. For consistency the analysis added in eight firms in the FY2001 G-500 that were not in the Platts 250 and this sets the final sample size at 102 firms.

The data elements required are all in company annual reports, available through firm websites. Quantitative research into M: P normally uses commercial information sources such as S&P 'Compustat', which is useful for large samples as it allows automated data extraction. Funding limitations meant that access to this product was not available and this lack of access to adequate secondary data sources defined the scope of the research.

OUBS guidance on options included the British Library which offers (controlled) access to the OneSource database. A sample output from OneSource is shown as Appendix Three. OneSource offers five years of company data and gives business and geographical segment summaries taken from company reports and formatted to tables that also included financial ratios and performance data. The data can be extracted in MS-Excel format but does not transform easily into a database structure and requires extensive cleaning and layout work.

Nature of the Data Analysis

Rugman and Verbeke (2007) define the core elements of geographic revenues as follows:

Figure diagram showing stacked bars labeled ROW, ROR, HOME with Sales % axis on left and Foreign Sales to Total Sales % on right, with brackets labeled F / T (or FSTS) and R / T (or RSTS).
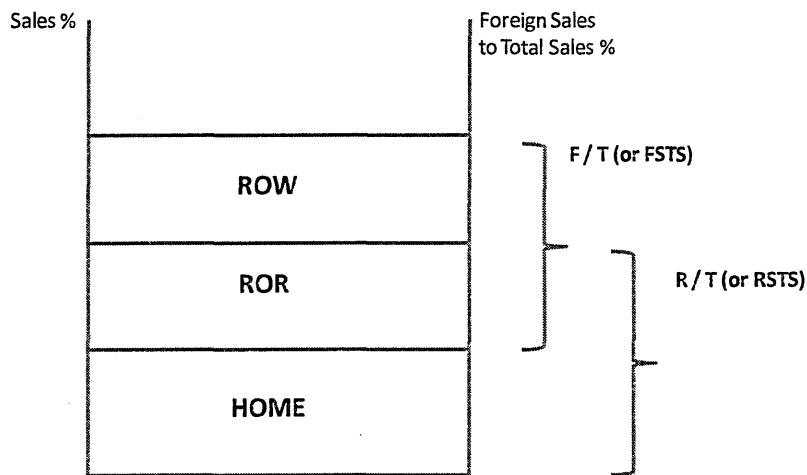
Firm- and country-level data. HOME, sales in the home country; ROR, foreign sales in the rest of the home region; ROW, foreign sales in the rest of the world; F/T, value of foreign (F) to total (T) sales, where F = S + X, where S = sales by foreign subsidiaries and X is exports by the firm from the home country (as recorded in annual reports of the firms); R/T, intra-regional sales (HOME plus ROR).

FIGURE 1:   Linking the F/T and R/T Multi-Nationality Constructs

In M: P analysis, performance is the dependent variable but where multi-nationality has been used previously as the independent variable, here it would become a dependent variable and multi-nationality as R/T would be the descriptive, independent variable as in Rugman and Oh (2010). The analysis would use a multi-nationality construct with OneSource providing parent information, based on subsidiary counts and financial data.

Rugman (2005) uses arithmetic comparisons of percentage data while the more complex quantitative analysis comes as the regression testing in Rugman and Oh (2010). New performance constructs could be generated from secondary data for doctoral research. Data as Reserve Replacement Rations (RRR) and Dry Hole Costs (Arnott and Antill, 2004) augments ROA/ROE/ROS, the most common financial measures used in M: P (Li, 2007).

Using OneSource to collect current geographic information firms, the first step was extraction of the 31/29[3] oil and gas firms from Rugman (2005) data with the intention to extend the data set to allow analysis of a five-year period. This would validate the process by comparison of the data points and trends Rugman reports. Extracting the data from OneSource and building individual tables for 102 firms across five years of data would also provide direct validation of Rugman data for FY2001 and the overall conclusions.

This first step tests the regional focus of firms, is presented as Figure 4 and begins the interpretation in Chapter Four. It was straightforward where firms report geographic segments and gives 64 observations from 102 firms. 18 firms are excluded as they had ceased trading through merger (e.g. Addax Petroleum acquired by CPCC in 2009) or were not identifiable as a 'firm' (e.g. Canadian Oil Sands Trust is a holding company). 20 firms do not provide segmented data, such as the state (Chinese) MNEs and were omitted in this initial analysis for replicability reasons. They are however addressed by later estimations.

The data elements collected were home country; gross reported revenue FY2008 (US$); home country by percentage revenue (%); largest region by percentage revenue (%). This does not allow allocation other than home region (D) when the 50% threshold is reached. Other categorisation (e.g. Global, Bi- or Host Regional - G, B or S) proved beyond the level of detail that OneSource – or Compustat for that matter – could deliver.

This lack of accurate data suggests either a move towards more generic and qualitative analysis methods – for example capture of data through questionnaires – or a more intensive and granular search through firm reported data. The former might be possible at doctoral level but was discounted here due to time and resource constraints.

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[3] *31 Firms in FY2001 is now at 29 following mergers between Phillips and Conoco and Norsk Hydro and Statoil*

Structuring the data to reflect the literature involved disaggregation of data into the constructs of Figure 1 to include Home Country (Home) and 'Rest of Region' (ROR). This shows where data was incomplete in Rugman (2005) and also tested the process. For ten large firms using SEC filings gave some outputs but the pilot testing also found data issues.

Royal Dutch Shell (RDS) was the model case as it offers historic data including reported NA/EU/AP revenue data for FY2001, giving opportunities for validation. Issues appeared when variations for the same 'element' were found, such as different values for FY2003 segment revenue (source online: versions 2003 and 2005 FAOI). There were variations on a single data item, for example the reported annual revenue for the EP business segment with high values inside the data that affected the revenue data in different ways. These were usually noted as 'inter-segment' values or 'eliminations'.

			2005	2004	2003	2003	2002
Exploration			23,970	18,400	12,224	15,256	18,409
Gas			13,766	9,625	7,377	7,852	4,588
Oil	Products		237,210	210,424	159,075	225,461	184,345
Chemicals			31,018	26,877	18,843	19,459	14,659
Other			767	1,060	843	864	767
			306,731	266,386	198,362	270895	224770

FIGURE 2:   Different Representations of RDS Annual Data

There were also complications with content in the sources. Initial review of annual reports had shown firms reported 'Oil and Gas Production' data annually but this addresses own production only, omits JV and non-WHS volumes and rarely correlates to annual revenue data given by firms by LOB. It also offers no data on the RM segment and the pilot test showed that the downstream revenues scale outweighed that of all other segments combined. This was different to the planning analysis when much higher levels EP profit over RM indicated where the collection and analysis would focus seemingly.

The variations in business segment allocations were also far more complex than originally envisaged from reviewing sample FY2009 annual reports. Organisational changes such as major M&A activity between reporting periods further exacerbated inter-segment complexity. Collation – formatting and storing – was problematic as report availability was checked but not report format and the read-only .PDF files precluded even 'cut and paste'.

The main data issues concerned the RM segment and involved value gaps between reported segment revenues when balanced to product sales and volumes of traded sales of third-party products. Treatment of non-subsidiary operations varied from firm-to-firm and data for the American firms was weaker as they report only US and non-US geographic segments.

Identifying that BP reported its RM traded volumes as a separate line item was the key to solving for the allocation of these segment revenues. The revenue figure from sales of refined product of US$ 166,088 billion in FY2008 is broken out and is consistent so the 'find' is the revenue from crude oil sales, as traded volumes, of US$ 35,625 billion. This alternative variable highlights different revenue generating activities that are hidden inside the firms.

The only standard element for longitudinal analysis is of 'hard' production data of common units, specifically oil and gas extraction by country and refined products segregated by types (for example gasoline) as revenue data is affected by price variation and as will be shown currency time effects. There are elements of reported revenue, predominantly excise taxes in downstream, which must be disaggregated. Reporting non-controlled subsidiaries must also be taken case by case and again volume data extracted and analysed.

The original research question is answered with the data from OneSource, and is presented in Chapter Four as Figure 4. However the initial data collection process also highlighted how the original question was insufficiently well determined and not fully informative. More detailed data analysis was required to make a tangible contribution to the theoretical debate whether firms operate globally.

Data not identified in the original design appeared consistently and in standard form. It included profit (earnings) by line of business; asset data by line of business in most cases and certainly at corporate level by geography; employee level data by geography and capital expenditure (FDI) by detailed geography for segments. Inductively this allowed subsidiary hypotheses and four new research questions that generated two additional 'new' findings.

The missing observations of the Rugman (2005) sample seemed to mask other effects, such as size effects for the industry and these are shown through the regression analysis in Chapter Four. Annual data over nine years for ten firms allow trend analysis and suggests analysis at both firm and business unit level over time as a better research focus for future doctoral analysis, perhaps as an opportunity to revisit the McGahan and Porter (1996) work.

At the operational level industry specific production data can be calculated for regional subsets of the core Triad in line with current debates in IB around region definitions. Separation of data and analysis of outcomes for the two main segments is the most informative approach and is parsimonious in that the rest of the businesses are marginal. As suggested above, the tensions between these two businesses, for example in firm level choices over investment capital allocations, offers a potential route for case study analysis at doctoral level. Access opportunities exist to do this across a range of the larger firms, based in part on personal networks, but here for M. Res. research are not appropriate

Primary Assumptions

The rest of this chapter details mechanisation of the analysis and the next sections focus on the research question and use of data. Appendix 1 shows the detail of the method and its estimation and materiality. It also has examples from BP and Chevron, for which the major assumptions are listed here. The sensitivity factors are also demonstrated in Appendix 1.

Assumption	Implication and Use	Impact / Sensitivity
1. Downstream revenue from refined products is assumed as local region sales for the refinery	These products do not report geographical sales destination but would not be exported if other supply sources are present extra region. Only material for the large firms, mainly US cases Supported by footnote (a) to BP 2001 Report	RM is larger so this factor might affect up to 5% of total revenue allocation
2. Traded sales of crude and gas excluded	Although revenue is generated, the COGS are almost the same and these are pure trading margin sales. Would be appropriate on profit analyses and arguably a 'global' revenue region Supported by footnote (a) to BP 2009 Report	Large element of revenues but can be excluded uniformly so no impact likely
3. Export sales of refined products excluded	No end consumer is identified for these sales which are around 20% of volumes. Excluded from the analysis and revenue lines when presented in data and hence taken pro-rata	Works for known refinery locations and home and non-home centric RM models
4. Chemicals taken pro-rata to refined products sales in the RM segment	Increasingly small element of firm revenues and linked to RM in most production processes so allocated in a similar manner	Around 1% maximum
5. Home market revenues can be extrapolated over time	Fewer firms report home country data as a segment so this estimation, based on BOE and refined products sold is needed and really only significant in the case of BP	Around 1% maximum
6. Mexico is in the NA region but does not feature as data	Pemex has monopoly in the downstream sector in Mexico and it is a net exporter of crude. This means NA is just US and CN plus Latin America	None expected
7. Smaller businesses, such as Renewable Energy, are not material	Whilst there are large descriptions of these 'new' businesses in company reports they offer little or no direct contribution to either revenue or earnings figures at this time	Around 0.5% maximum

Correlating Theory and Data

The pilot data collection exercise showed that, for the constructs of Figure 1, Home Country Sales/Revenue (HOME) is available. US firms generally report US data against RoW data and European firms likewise address home revenue (e.g. Spain as Repsol, Italy as ENI) with the two significant exceptions of BP which now reports US data and RDS with its dual nationality. Most of these home revenues can only be derived using this segmented data which means that the method already increases the accuracy and number of the F/T data.

Home Region Sales/Revenue (ROR) is also available. The relative size of American firms and home market dominates the NA region but data on their Canadian operation exists. Mexico is excluded as above. EU firms have a European view although EEC enlargement is a complication. Russian firms as Lukoil are complex as the CIS nations were previously the USSR. They require individual analysis and are not transparent in their OneSource reporting.

Foreign Revenue outside Home Region (ROW) is also available. In its simplest form the RoW/T variable can be constructed if treating RoW as a single value outside of home region. This broad multi-nationality construct is however not informative enough to answer the research question based on the Triad model nor to replicate the analyses by Rugman (2005). This ROW/T construct is the complement to the R/T variable that Rugman and Oh (2010) use in their regression analysis so it is possible to validate, through replication, elements of their regression equation (Rugman and Oh, 2010).

Validation and Triangulation

Triangulation of results checks consistency and uniformity and is an important part of analysis (Bryman and Bell, 2003). An effective technique here was using historic sources for the same data – usually from later annual reports – to cross-correlate calculations. Other validation analyses carried out have addressed oil price, currency and volume data checks.

Regression techniques require a sample size large enough to generate statistically significant results and here ten years and fifty firms would have given a 500 observation set but this was not possible with manual data extraction. OneSource could give 125 observations across 25 firms and five financial periods and matches well to the Rugman (2005) EPR list of 31 firms but materiality analysis below shows that this sample is heavily skewed by firm size.

The other complexity lies in disaggregation into the 'regions' and the challenge of inconsistency of definitions, particularly in the high revenue RM segment, with the lack of granularity in reported geographic data. ExxonMobil is the largest typical case with just US and non-US data and is typical but now analysis by business segment using production volumes gives enough detail to show how ExxonMobil and others are 'global' at LOB level.

Oil price variations across time do not affect this method since it uses volumes rather than receipts. Wide ranges of revenues are reported at firm and business segment level but the industry profitability model seems independent of these fluctuations. Oil price tracked against revenues and earnings for the two main business segments is one of the control variables used in the correlation analyses in Chapter 5 and shows limited effects.

Currency effects on revenues are complex. Oil is priced in US$ but the operating currency of many firms is different and the local currency of the host market will also vary. Movements of the US$ against EU€ were around +/- 35% from 2001 to 2010 and linking this to revenues in recovering Asian currencies post-1998 has a complicating effect over time.

The sole Home region oriented oil 'major', Total, is an anomaly due to this kind of effect. Its Asia-Pacific (AP) regional revenue figure drops from 35.9% to as low as 20.5% whilst Home (France) increases yet levels of French production and revenue drop when compared to the other regions. This is clearly a finance effect but needs to be allowed for in future work.

Non-US$ reporting firms have progressive data year-on-year but also hence face varying annual exchange rates. The simplifying assumption taken is that refineries are fixed assets and supply outputs to a single region. When this taken this allows estimation of the refinery capacities and these currency effects are thus mitigated as production volumes are ordinal values based on a standard oil price and is thus not country and currency specific.

Conclusions on Method

The better explanatory element for longitudinal analysis of the oil and gas industry is 'volumetric' data such barrels of oil produced. This is a change from the method of data collection from Rugman (2005) but can be seen as a direct parallel. It also avoids complex calculation and coding to mapping annual price data by location and product.

Revenue is affected by currency and oil price variations and the complexity of the business models of the large firms generates results that do not aid sector comparison of revenues. Several elements of firm reported revenue must be disaggregated and one learning for future work is to use a 'pro-forma' to segregate the tax and inter-firm transfer costs.

This process must also identify the methods firms use to report on non-controlled subsidiaries as it will inform further the multi-nationality and performance tests, Care is needed on tracing these ventures, BP-TNK in Russia being the signature case that highlights both the complexity of internationalisation but also the difficulties of tracking these joint ventures and alliance style operating models.

Overall the method generated 'results' that came to +/- 1 or 2% of verifiable numbers (e.g. later reporting of prior year regional revenues) and thus is suitable for use in comparative analysis of values year on year as these small differences are attributable to common factors between years. Appendix 1 gives worked examples of the firm and line of business calculations and also substantiates these accuracy estimates.

CHAPTER FOUR: DATA INTERPRETATION

This chapter addresses three separate elements of the data. The first addresses the original research question using the OneSource data and the full sample of 102 firms. Additional analyses and conclusions from the extended hypothesis are then discussed before a final section addresses more complex statistical analyses to show how regional revenue data might be used for multi-nationality and performance testing with a larger sample.

Outcomes against the Initial Research Question

Figure 4 below shows the home country and home region sales for the 64 observable firms. Result 2 shows that the numerical majority of oil firms are significantly home region and home country based, in line with the outputs from Rugman and Verbeke (2004). Rugman (2005, Table 2.8) suggests 66.0% home region focus for the EPR firms, A formal definition of the EPR set of firms is not available nor is this sector now reported n the Compustat data.

The EPR set was tested separately and Figure 5 details the results available for FY2001 and FY2009 using two alternative but complementary interpretations. The result for EPR FY2008 is 66.1% home region focus and the new data shows home country focus at 47.7%. These results match Rugman (2005) 66.0% and show good support for that original analysis.

FirmType * Region Crosstabulation

Count

		Region			Total
		AP	EU	NA	
FirmType	Exploration	10	4	21	35
	Integrated	11	13	18	42
	Refining	16	5	4	25
Total		37	22	43	102

FIGURE 3: Summary of OneSource Data Analysis using SPSS Crosstabs

This outcome negates the hypothesis in the original research question with the finding that there is no clear, global pattern in the revenues of the oil firms.

Region	W-Revenue	W-Region	Result	Sensitivity	
NA	$ 966,323	$ 572,981	59.3%		
EU	$ 1,114,431	$ 645,711	57.9%		
AP	$ 482,900	$ 420,863	87.2%		
Result (1)					
Overall	$ 2,563,654	$ 1,639,555	**64.0%**	Revenue	$ 4,110,696
				Omitted	$ 1,547,042

Region	102	Category	102		
NA	28	Global	4	Observations	102
EU	18	Bi-Regional	2	Cases	64
AP	18	Host Region	1	%	63%
		Home Region	57	Rejected	38
Result (2)					
Insufficient (I)	20	I	20	I	$ 1,283,681
Excluded (X)	18	X	18	X	$ 263,361

Region	WREV + 90%	WREG + 90%	Result	90% Threshold	
				I	$ 1,283,681
				X	$ 263,361
Result (3)				Revenue	Region
Revised	$ 6,602,082	$ 5,274,141	**79.9%**	$ 4,038,428	$ 3,634,585

Region	WREV + Z	WREV + Z	Result	Additional Cases	
				Z	$ 582,983
Result (4)				Revenue	Region
Revised	$ 3,146,637	$ 2,164,240	**68.8%**	$ 582,983	$ 524,685

FIGURE 4:   Summary Presentation of OneSource Data Analysis I

Figure 3 gives Result 1 as 64.0% for Home Region revenue. This $1,640 billion represents 64 completed observations for FY2008 and addresses $2,564 billion of $4,111 trillion revenues for 102 firms. 18 and 20 firms are omitted for reasons of type/fit and insufficient data respectively, the latter group losing $1,284 billion. Company reports show many of these are clearly >90% home based and this assumption informs Result 3, now higher at 79.9%.

This aligns well with the 80% threshold Rugman (2005) reports for the G-500 overall. Finally the EPR revenue is $528 billion, giving a result of mid-point outcome of 68.8%. The assumption of 90.1% for this data is as Rugman (2005) and is methodologically consistent.

FY2008 DATA FOR REGIONAL (COUNTRY) S-31 - as RUGMAN (2005)		
Country	**Region**	**Revenue**
$1,033,919	$1,326,444	$1,805,046
57.3%	73.5%	

FY2008 DATA FOR REGIONAL (AND COUNTRY) S-31		
Country	**Region**	**Revenue**
$1,859,421	$2,366,872	$3,582,772
51.9%	66.1%	

FY2001 DATA FOR REGIONAL (COUNTRY) S-31 - as RUGMAN (2005)		
Country	**Region**	**Revenue**
$261,943	$408,987	$611,700
42.8%	66.9%	

FY2001 DATA FOR REGIONAL (AND COUNTRY) S-31		
Country	**Region**	**Revenue**
$363,176	$586,534	$1,038,200
35.0%	56.5%	

FIGURE 5:   Summary Presentation of OneSource Data Analysis II

Recreating the original FY2001 data is possible using the Appendix in Rugman (2005). It is possible to recreate an outcome close to 66.0% but this is achieved by the combination of two quite separate groups, with a value of well below 66% for the oil firms (56.5%) and a much higher value for the energy firms (over 80%).

If 56.5% is the accurate value for oil firms this firstly would diminish the strength of the Rugman (2005) argument of regional focus for this industry, although it is less than 10% of the total G-500 sample. It indicates also a trend between FY2001 and FY2008 of an increasing home regional focus as opposed to a more global model as the value of FY2001 at 56.5% is appreciably lower than FY2008 generated at 62.5%.

Recreating analysis of the oil firms in EPR set using FY2008 data gives the result of 73.5%. This seems to indicate a movement towards increased regional focus rather than evidence globalization but this may be a false effect driven by the lack of data for the more international firms. New methodology allows the calculation of the FY2008 result for the set and this gives 67.5%, close to the original Rugman (2005) position.

Outcomes from the additional data – Trends and Segments

Analysis of this sector is limited by the materiality of revenues in such a highly concentrated sector and Figure 6 shows that the sector is dominated by a small subset of the total firms. Using data for 864 oil and gas firms recognised by Compustat[4] for the exploration (622), refining (179) and integrated operations (63) sectors, we find that the 50 largest firms generate 97% of sector revenues, with the largest 20 accounting for 87%, year on year. OneSource gives data for these firms (as Appendix 2) and we find that the same 30 firms feature towards the top of the set each year and 44 firms are in the top 50 across all of the three years. The ranking percentage of revenue for these firms also does not vary despite variation in oil prices (shown here as $53.48, $91.48 and $64.20 for 2007, 2008 and 2009).

2009	$ 2,593,281		$64.20	2008	$ 3,845,857		$91.48	2007	$ 3,309,570		$53.48
10	$ 1,806,641	70%	70%	10	$ 2,589,065	67%	67%	10	$ 2,220,620	67%	67%
20	$ 2,264,163	18%	87%	20	$ 3,315,272	19%	86%	20	$ 2,901,910	21%	88%
30	$ 2,404,499	5%	93%	30	$ 3,537,394	6%	92%	30	$ 3,078,660	5%	93%
40	$ 2,482,085	3%	96%	40	$ 3,660,306	3%	95%	40	$ 3,177,704	3%	96%
50	$ 2,518,598	1%	97%	50	$ 3,719,757	2%	97%	50	$ 3,223,986	1%	97%

FIGURE 6:   Materiality analysis of the oil and gas sector

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[4] *Obtained from S&P directly as part of the initial data collection and used with their written permission*

Tables 2a and 2b (Appendix) show FY2001 data for the ten firms with the largest revenues (72% of FY2001) where data was available and presents enhanced FY2001 data finding two new 'Global' ('G') and one Bi-Regional ('B') cases. Royal Dutch Shell (RDS) and ExxonMobil had sales of more than 20% in three regions without a 50% home region focus. This outcome can be validated (e.g. the RDS 2005 Review). BP was correctly categorised as a 'Bi-Regional' but data now shows it very near 'Global' with only AP missing the 20% threshold.

Rugman (2005, p. 66) suggests that a home region focus is due to localised, customer specific FSAs that do not transfer overseas. Home focussed, customer specific FSAs for oil firms are though less important as the base material is generic as crude oil or its refined products such as gasoline. Non-location bounded FSAs such as technology and financial capital strength are instead the differentiators and would drive diverse strategies.

BP achieves Global ('G') revenue in or before FY2002 and other firms are also more regionally diverse than identified as the lack of overseas sales data had precluded inclusion of many cases. Chevron was 'Bi-regional' (B) and could have been a 'Host' region (S) case given the scale of its Asia-Pacific operations. Both Total and Repsol YPF also have significant second region revenues identified but are classified 'Home' (D) with the 50% threshold. BP and Shell no longer give 'home' data so this is derived by estimates from prior year reports.

Rugman and Verbeke (2007, p. 3) also suggest that resource based industries are a potential exception to the Triad and this analysis has disaggregated revenues using a different form of model. Russia and Africa are included in a wider AP region that varies from that of Rugman and Verbeke (2004) but reflects the far eastern geography of Russian oil and an increasing Asian presence in Africa. The Middle East does not feature as the oil firms have lost position to the national oil companies but major gas projects (e.g. Qatar) may well see this reverse.

Many firms report only US and Rest of World (RoW) segments. The analysis here builds data for other NA region countries and then segregates EU and AP revenues. The main factor in the NA analysis is Canada and the OneSource data includes a high number of Canadian cases (13/102) reflecting recent development of oil sands projects. This is however probably a temporary effect and analysis across a longer time frame will remove likely this element.

Rugman (2005) takes Latin America into his NA region but suggested this 'tri-partite' model was only a starting point for analysis and that more enhanced models of world trading regions should follow. The piloted ten firms list is relevance to Latin America, Africa and Russia as Repsol YPF, Total and BP report significant revenues there with an Argentinean YPF business unit, African colonial production and a joint venture, BP-TNK, respectively. Recent discoveries in Brazil have attracted the large oil firms and Australia, as Oceania, is set to become another new hub (source 'The Sunday Times', 5th Sept 2010).

Osegowitsch and Sammartino (2008) questioned parameterisation in the original Rugman and Verbeke (2004) analyses and argue for and test other extra-regional thresholds, including 10%/10%. Rugman and Verbeke (2008) reject this, noting that firms with 80% home region revenues could thus be defined as global but interestingly even at 10%:10% note that there are no 'new' global firms.

Table 2 presents data from the new method and shows this may not have been correct but the principle that few global firms are found is consistent. Osegowitsch and Sammartino (2008) also highlight potential over-determination in the 50% Home threshold. Home country sales inflate home region activity but are not linked to foreign direct investment, a point echoed by Dunning, Fujita and Takova (2007).

Osegowitsch and Sammartino (2007) proposed new constructs of home country (HOME) and rest of home region (ROR). Figure 1 shows this split and links to their finding that non-region foreign sales (ROW) were 2.5 times more than ROR. This is another case where the benefit of using rational rather than ordinal data is important. This enhancement also addresses the large size of the United States and Japanese domestic markets relative to their neighbours in their home region, which were all small until the re-emergence of China.

The Home 50% 'allows' inclusion of many firms where full data was unavailable. Home country and home region focussed firms may however have been over represented in the 380 firms as by definition they have less complex geographic data than global firms. 'Local' firms are thus easier to identify when seeking dispersal data in sources – SEC filings and company reports – that do not mandate this data content. Relaxing the 50% Home level when a host region is above 20% is appropriate given there are now fewer data points omitted but for comparison and discussion all Tables here use still operate the 50% level.

The re-allocation of Russia (RU) and Africa (AF) from EU to AP also affects some results. Foreign investment (entry) into Russian oil firms is now declining and where the RU/AF effects can be tested – firms reporting their own regional distributions to allow comparison with the estimate – the impact is small at perhaps +/- 1% difference for most cases across changed regional definitions. Appendix 1 has analysis and an example to support this view.

The oil trading subsidiaries of the large firms have however no end consumer but are large elements of revenue. Davis (2006) suggests only 1% of traded oil volumes has actually been physically extracted. These 'turnover' revenues are location independent and have no consumer. They are arguably a fourth, 'virtual' region of revenue and could be shown as such so here they are removed from and thus segment results give only product revenues.

This was appropriate for analysis of revenue but not profit. Trading activity is increasingly material to firms so a more detailed allocation model is required for any earnings based analysis. This distinction between revenue and profit or earnings is important as selection of revenue as opposed to profit or another performance measure works well in addressing firms selling tangible products. It avoids issues of cost apportionment and transfer pricing optimisation on intermediate product sales inside firms but is moderated by many factors.

This is a key method point. To illustrate, BP showed UK (22.6%) and Rest of Europe (22.8%) in 45.4% total EU FY2008 revenue. BP has reduced its UK presence over time; in 2005 only 40% the size of Rest of Europe for RM revenue and today BP has decreasing UK (North Sea) EP operations and no UK refining capacity. The UK cannot generate 22.6% of revenues other than from the significant non-production based trading in London (2005 FOI, p 68, Note 'b'). Table 2a has BP in the UK at 8.6% (FY2009), far lower excluding the traded non-BP production which analysis of FY2009 - FY2007 shows steady at 17% of downstream revenue.

Intersegment sales reflect vertical integration of supply in oil firms and are also significant amounts which can distort the scale of business segment revenues. They are non-third party transactions so this analysis uses original production revenues to allocate them back to the home segment, usually EP. Analysis must also account for excise (fuel) duty payable locally.

The use and comparison of percentage values in longitudinal studies requires care. Chevron refining seems to move to AP for 2001 to 2009 but this is not correct. The AP capacity is constant but reductions in EU and NA suggest otherwise. Mergers can generate false trends and here after the Texaco merger Chevron divested US refinery assets for the regulators. Trend analysis is better for comparing production quantities/volumes rather than just ratios of geographic revenue, particularly given the effects of currency movement over ten years.

SEC regulations state materiality of 10% or greater in segments must be reported and aids firm-by-firm comparison once a baseline of product and location is defined fu. This increased availability of production data directly influenced the data collection and is used here to generate new insights and provide

Table 4 takes ExxonMobil from the summary (corporate level to business segment). ExxonMobil EP has only 22.8% Home region whilst RM is far more localised at 50.0% (FY2009) and the diversity is consistent across nine years. The nature of refineries as fixed assets limits any RM shift extra-region (48.5% to 50.0%) while for resource specific EP there is a Home decrease (39.6% to 22.8%).

The difference is common to the large firms and Figure 7 below shows the majors evidencing a move out of Home region in the EP segment but again care is needed as absolute home region revenues increase but not as fast as the extra-region. Supporting data for these conclusions is available and is in the tables after in the Appendix.

$MILLION		EUROPE		AMERICAS		ASIA-PACIFIC		OVERALL	
		Revenue	Percentage	Revenue	Percentage	Revenue	Percentage	Revenue	Percentage
SHELL	2009	16181	30.1%	11921	22.2%	25649	47.7%	53751	100%
	2001	8694	35.3%	6543	26.6%	9391	38.1%	24628	100%
BP	2009	5598	11.0%	21566	42.4%	23671	46.6%	50835	100%
	2001	7008	27.4%	14130	55.1%	4484	17.5%	25622	100%
EXXONMOBIL	2009	16819	25.7%	14898	22.8%	33710	51.5%	65427	100%
	2001	11185	34.6%	12806	39.6%	8332	25.8%	32323	100%
TOTAL	2009	7227	28.0%	1421	5.5%	17171	66.5%	25819	100%
	2001	6190	40.0%	467	3.0%	8837	57.0%	15494	100%
CHEVRON	2009	3281	7.6%	14584	33.9%	25211	58.5%	43076	100%
	2001	1755	8.7%	10543	52.4%	7804	38.8%	20102	100%
	2009	49106	20.5%	64390	25.3%	125412	54.2%	238908	100.0%
	2001	34832	29.2%	44489	35.4%	38848	35.5%	118169	100.0%

FIGURE 7:   EP revenues for the super-majors across 2001 and 2009

Revenue is an absolute value and takes no account of the costs of goods sold or nature of production. Investigation of intra-firm data shows that oil firms declare revenue figures containing significant amounts of 'traded goods', predominantly oil and gas, that is not produced by their (inter)national operations. Chevron in the US produces only 1,399 billion cubic feet of natural gas per day (MMCFPD) but sells 5,901 MMCFPD and declares this higher value in its revenue figures, creating a physical value add gap of $6.1 billion.

Aharoni (2006) suggested firm size may not be a moderating variable in strategy and performance so smaller firms not in the G-500 might act differently. Having taken size of revenue as the criterion to define his sample Rugman (2005) then uses simple counts of categories, with outcomes as percentages, which seems inconsistent. The scale of revenues suggests weighted analysis as the better method and aligns with the data as presented in Table 2.8 (Rugman, 2005). Thus, if gross profit is taken instead of gross revenue outcomes are more global for firm operations. Figure 8 summarises these varying interpretations.

FY2009 Data $US millions	Firm Count	Intra-Regional		Inter-Regional	
Firm Count	10	6		4	
Firm Count	54	51		3	
Total Count	64	57	89.1%	7	10.9%
Average Percentage	10		59.1%		41.0%
Average Percentage	54		88.3%		11.7%
Total Percentage	64		83.7%		16.3%
Weighted Revenue	10	$ 801,230	50.0%	$ 800,373	50.0%
Weighted Revenue	54	$ 838,326	87.1%	$ 123,725	12.9%
Total W-Revenue	64	$ 1,639,555	64.0%	$ 924,099	36.0%

FIGURE 8:   Effects of Interpretation in Numbers

From this small sample the diminution of the intra-regional preference can be seen when different data elements are analysed. By count the data suggests 89% of firms which diminishes to 84% with percentage analysis and drops to 64.0% here when weighted revenues are addressed, with the ten largest firms achieving a 50%:50% distribution. Taking this one further level, ExxonMobil shows 82.6% of FY2009 profit was generated outside of the USA and is almost entirely <u>outside</u> of home region. As a 'Global' wider distribution is to be expected but this indicates an inter-region dominance in profit sources and this can be evidenced for most of the larger oil firms – i.e. those with established operations overseas.

Outcomes from additional data – Testing Multi-nationality and Performance

Rugman and Oh (2010) offer the following representation of the M: P formula:

$$\text{PERF}_{it} = \alpha_0 + \alpha_1(\text{MULTI}_{it}) + \alpha_2(\text{MULTI}_{it})^2 + \alpha_3(\text{MULTI}_{it})^3 + \alpha_4(\text{SIZE}_{it}) + \alpha_5(\text{ADV}_{it}) +$$

$$\alpha_6(\text{RAD}_{it}) + \alpha_7(\text{MULTI}_{it} \times \text{ADV}_{it}) + \alpha_8(\text{MULTI}_{it} \times \text{RAD}_{it}) + \gamma_i + \eta_t + \xi_{ijt}$$

Where PERF is the dependent variable, taken as ROA, ROS or Tobin's Q (TBQ); MULTI is taken as either F/T or R/T; t is a year value and j is an industry value for firm i. ADV is advertising and RAD is research and development (R&D), two traditional proxies used to model the FSAs related to Brand and Technology.

The last three terms address fixed effects of industry and year plus a residual error, ξ. Rugman and Oh (2010) suggest that ROA and ROS do not have statistically relevant correlations to multi-nationality and that F/T is inferior to R/T as a predictor of performance. They model each of these scenarios and produce a table of comparisons (2010, p. 7 and Appendices A and B) that supports this conclusion.

ADV and RAD data are not readily available – as noted by Rugman and Oh (2010) – so using a reduced form of this equation, with a linear extrapolation of the F/T and R/T values for the years between 2001 and 2009 gives a comparable analysis using the oil industry data. Tobin's Q cannot be derived without access to Compustat – and indeed only a simplified version of Tobin's Q is feasible even then – but we can derive data for ROA and ROS. Taking the following then as a first approximation of their model:

$$\underline{PERF}_{it} = \alpha_0 + \alpha_1(MULTI_t) + \alpha_2(MULTI_t)^2 + \alpha_3(MULTI_t)^3 + \alpha_4(SIZE_t) + \alpha_5(OILPRICE_t) + \eta_t + \xi_{ij}$$

Where (OIL PRICE) is the end of year value of oil included to control for the specific industry effects for this sample. MULTI is tested as F/T and R/T and SIZE is represented as Natural Log (Revenue) and Square Root (Revenue) is also modelled to test its representativeness.

In contrast to Rugman and Oh (2010) analysis finds a statistically significant effect for the ROS performance (dependent) variable with R/T in single power with a Pearson Coefficient of 0.53. As with Rugman and Oh (2010), F/T seems to have no predictive power for ROA or ROS. A significant effect with R/T is also seen using ROA as the performance parameter but with lower explanatory power and the Pearson Coefficient drops to 0.32. These correlations are tabulated and presented as Appendix 4.

One new finding not evidenced in literature to date indicates that increasing inter-regional operations may be the most effective strategy. Using the 64 firms -0.56 is achieved for the correlation of revenue and extent of multi-nationality. The suggestion on regional over global strategies suggests the largest revenues will be for firms dominating their region and correlating Total Revenue with Regional Percentage would be positive but the negative sign of this correlation suggests that revenue is maximised when multi-nationality is minimised.

This is reasonable if one assumes increased scale (revenue) can be achieved with experiencing limiting diseconomies of scale and suggests the curvilinear model of multi-nationality and performance is not universally applicable. The regression presented below also fails to support scalar based decline and shows effects related to the size of organisations could be addressed rather than consideration of multi-nationality data alone.

Neither does the Oil Price correlate in a significant manner to performance which supports the statement made earlier in this paper. There is a need, in this sample of very large firms, to model for firm size so the resultant regression equation can be expressed as follows:

$$\text{ROS} = -0.391 + 0.254 \text{ (MULTI)} + 0.072 \text{ SIZE}$$

Where the values of MULTI and SIZE are significant to 0.01 (one tailed). This result was derived using SPSS and a Stepwise Regression against the variables of the model above.

Descriptive Statistics

	Mean	Std. Deviation	N
ROS	.132742	.0563827	78
RSTS	.646308	.1973487	78
LOGREV	5.027513	.4006568	78
OilPrice	47.342051	21.7571320	78

ANOVA[d]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.069	1	.069	30.024	.000[a]
	Residual	.175	76	.002		
	Total	.245	77			
2	Regression	.102	2	.051	26.614	.000[b]
	Residual	.143	75	.002		
	Total	.245	77			
3	Regression	.103	3	.034	17.809	.000[c]
	Residual	.142	74	.002		
	Total	.245	77			

a. Predictors: (Constant), RSTS

b. Predictors: (Constant), RSTS, LOGREV

c. Predictors: (Constant), RSTS, LOGREV, OilPrice

d. Dependent Variable: ROS

The sample size was 78 observations from eight firms – two of the ten of the pilot set firms had not yet merged in 2001 – across 9 years and was almost complete, just two years of reporting missing for one firm. The Analysis of Variance (ANOVA) output shows that the regressed variables are significantly associated with the dependent variable, ROS, with F-values that suggest a confidence level of less than 0.01, which equates to a 99% threshold.

The R^2 value for this model is 0.42 which compares well with the Rugman and Oh (2010) values for their Tobin's Q modelling, where R^2 was seen at values around 0.41 to 0.29. The correlation matrices that resulted are attached as Appendix 4. The lack of predictive power of the F/T variable is shown by a low correlation co-efficient against ROA and ROS and no statistically significant outcomes, in contrast to the R/T analysis. This data is examined in Appendix 4 and the larger regression outputs from SPSS are also laid out there.

The power of the R/T variable seems irrelevant and the first order value (R/T) for MULTI is sufficiently explanatory. There is thus no evidence to support a quadratic or cubic function. The strong result from ROS is mirrored when addressing PROFIT as well and this correlation is much stronger than suggested by the ROA variable. This suggests that asset based measures are less accurate and ties to the literature analysis in Chapter Two which notes that asset valuations in oil and gas firms are very complex and probably misleading.

This also suggests that even a performance measure such as Tobin's Q would likely not be an effective predictor of performance here since it takes asset values in its denominator. This suggests that the contribution of this research – whereby differentiation between lines of business in terms of returns and multi-nationality is highlighted – also highlights firm level performance modelling for multi-nationality is inappropriate in this dichotomous sector.

Any firm level measure for the oil firms may mask line of business effects, so for example using profit across a firm valuation and overall multi-nationality value when the profit comes from EP but the revenue is dominated by RM will give an inconsistent outcome. The next step in the research will be to test the multi-nationality and performance relationship for these same firms but taking a line of business level view with segmentation between the refining and exploration businesses and indeed between these types of firms within the industry as well.

One promising line of performance modelling was exposed in the data collection process for Chapter Four and echoes the work of Arnott and Antill (2004) and also that of Mohn and Misund (2008). It suggests that taking hard production data for the two main business segments would be a better comparator of performance and would also describe better the features of multi-nationality such as country counts. However that is also beyond the scope of this Masters Research but would include tracking both operational metrics such as Reserves Replacement Ratio (RRR) and running comparative analyses between firms.

CHAPTER FIVE: SUMMARY OF FINDINGS

This chapter links the research question and theoretical argument with five findings. It suggests future doctoral research should build new constructs for multi-nationality and performance and use methods for large samples to mitigate the limitations discussed below. Rugman and Oh (2010) suggest that there is a better correlation found when using performance based measures that reflect market values and the nature of the industry.

Finding 1 is that the S-102 sample does not show the oil industry as global. The Appendix has Table 1 which shows summary information for 102 firms from OneSource for FY2009. The numerical majority of oil and gas firms are home region focused, with a count of 57 'D', home region biased firms. However, the low number of full observations (64 from 102 at 63%), shows that still only partial geographic data is available today from firms despite increasing regulatory reporting requirements over the time period.

Compared with Rugman (2005) two further observations can be made. The trend from FY2001 to FY2009 is towards higher inter-regional revenues for the largest firms. The result is based firstly on the OneSource data and with estimation of the 'missing' values for certain of the high revenue firms, mainly the state oil companies. Analysis shows that the largest firm revenues come from those with the highest inter-regional sales rather than local focus.

Building on this data, correlation and regression analyses using approximations of regional revenues over home country sales show there is qualified limited support for the use of multi-nationality as an independent variable to define firm performance. Specifically the use of accounting based measures such as ROA and ROS, which use profit data, are skewed when there is an uneven profit contribution across the segments of larger firms.

Finding 2 is that there were undiscovered 'Global' cases in the FY2001 data. The Appendix has Table 2 which shows that this new method finds two 'global' <G> firms, Royal Dutch/Shell and ExxonMobil and a 'bi-global' <B> firm, Chevron. This is a high number – 2 'G' and 1 'B' in 10 to the original 9 'G' and 25 'B' in 370 firms – and suggests an industry specific factor that aligns with the theoretical literature of vertical integration in oil firms.

Finding 3 is that the trend is towards an increasing global firm footprint. Table 2 also extended the analysis for FY2009 for S-10 and finds a further Global (BP). An interpretation without the 50% Home threshold also suggests two additional Bi-Regional 'B' firms in Repsol YPF and ConocoPhillips. Data over nine years for ten firms yields data that evidences a move away from home country in most cases; a move away from host region in most cases with an overall movement towards AP and away from home region in some cases.

Finding 4 is that business segment revenues show intra-firm variations. Table 4 shows an intra-firm comparison of revenue between the Upstream and Downstream elements of one firm, ExxonMobil. This reflects the literature discussions of the oil firm value chain, vertical integration in oil and the different FSAs associated with the two mainlines of business in what is termed the 'core competence' model. Further trend analysis of the EP segment for the majors as Table 5 also demonstrates a move to wider global operation in this segment.

Finding 5 is that weighting revenue and profit data increases the global effect. Using weighted figures with regional revenue expressed as a percentage of the total revenue and then with a broad allocation of profit data shows stronger inter-regional trends in the EPR. This highlights issues of interpretation as the EP segment is the main profit source for oil firms and is the most regionally diverse but does it not contribute as much gross revenue.

Discussion

Rugman (2005) uses ordinal data with numbers of firms rather than relational values. However the selection of firms was on revenues so one can argue the analysis should also be relational else one small firm has equal status as one large and with the selection bias cited above gives local firms a dominance that may not reflect reality (see note 2 also).

Rugman (2005) had insufficient data to classify the largest oil firms as global. Two were categorised as 'Near Misses' but the data also showed they could not be home region. Using weighted, new data for the biggest ten firms the absolute revenues are markedly less regionally concentrated. The sheer size of the 'majors' is key: RDS at #1 in the G-500 FY2008 revenue of $458 billion which exceeds the total revenue for firms #22 to #33 of the S-102.

These are issues of interpretation and the same applies to profit (earnings) as a better measure in theoretical discussion. Figure 8 above shows summary analysis with weighting of revenue and then the same for profits. Both give a stronger suggestion of 'global' operations as the EP segment is more profitable and is geographically the far more diverse. However, testing if this correlation has a causal or coincidental nature is beyond the scope here.

The weighted result for S-102 is 62.9% home region focus with 47.3% home country focus. Allowing for rounding this compares well and supports Rugman (2005). This is the null hypothesis in the original research question and thus the oil and firms can not be considered to be 'global'. However there are effects related to the structure and operations of oil and gas firms, largely related to the asset- and resource- specific nature of the industry, that do show an increasing trend towards globalisation and merits further analysis.

Limitations of the Research

This research was constrained by data availability and regression studies require larger samples. M: P uses increasingly advanced quadratic and cubic models of correlation coefficients but this 102 set is too small when split to three categories of firms, further divided to three regions, to give useful results. Future analysis needs to increase the sample size but this needs additional data. Access to the S&P 'Compustat' database, including the Industry Specific Factors for operating performance data, is required to do this efficiently.

However, another limitation is the materiality of the smaller firms. S-102 already features firms so small in terms of revenue that they are dwarfed by the majors and taking (log) revenue as the size construct is important as the regression shows (SIZE) is a moderator. The complexity of case selection in this industry requires further analysis. While weighting by revenue addresses selection of firm in Rugman (2005) and gives a distribution of real revenues by region it still does not reflect levels of FDI or other aspects of MNE globalisation. Equally, the population of oil firms is an overwhelming majority of small, local firms and a weighted figure from that wider set or full further supports Rugman (2005).

One final challenge is to demonstrate what is 'new' and as an empirical extension of Rugman (2005) this work amends earlier results but also suggests intra-firm research, not addressed in the current academic literature or any comparable industry research, is necessary. The trend focus over nine years using volumetric parameterisation, rather than finance or accounting data also separates it from the analysis of the equity researcher. Recent Norwegian studies into the effects of capital structure and firm size on investment, for example in Mohn and Misund (2008), exist but these are largely country specific works.

There are differing cycles of profitability across the EP and RM segments but the results still show significant and increasing global profits. Profit is a lagging indictor behind revenue but both are significantly behind capital investment in this industry, as much as 20 years in large scale capital projects (e.g. Qatar GTL). Addressing capital investment data would show other facets of this movement to inter-regional operations and is available in annual reports.

The purpose of this Masters Research was to develop better theoretical understanding of the concepts of multi-nationality and performance and to test new methodology that would be appropriate for doctoral level research. This has been achieved and this multi-nationality analysis will inform the first element of the Ph.D. programme both in process and scale. That Ph.D. research will develop performance measures and define a new model for multi-nationality and performance in oil firms using FY2010 data when available from mid-2011.

This will in turn generate new data that will likely show the gap extending between the two main segments of oil firms. Evidence in the industry around extra-cyclical disposal of assets and de-internationalisation in the withdrawal of the majors from many countries suggests that there is a long-term portfolio rebalancing taking place. This would be fertile ground for analysis by qualitative means, both in terms of the 'what' and the 'how'. Access is always an issue for qualitative methods but this approach is feasible using existing personal networks.

Research into concentration and competition at the regional level would be another aspect of this work. Weston *et al* (1999) suggest that the industry is increasingly fragmented but evidence of recent investments suggests that the extent of non-equity joint venture activity, broadly 'alliances', means a possibility of tacit collusion on the part of the largest firms.

Future Research

The research finds that a 'downstream' business is unprofitable due to a lack of FSAs whereas an 'upstream' business offers super-ordinary profits over time when firms can capture CSAs arising through the ownership rights of scare resources. Firm FSAs in the industry are technical and marketing focused but the failure of diversification strategies suggests they have limited transferability outside of the industry. The FSA of lower (investment) capital cost for large firms is not discussed in the literature and further work linking the SIZE variable, shown above to have a correlation to performance, would be effective for this industry and similarly extractive sectors.

The literature suggests some form of oligopolistic welfare loss for the industry and Casson (2010) suggests, in line with Popper (1959), proof by hypothesis and testing of negating models would show that a) some of the majors should have failed that b) there should be many small firms homed in neutral countries and c) correlation between oil price changes and firm performance should be evidenced.

Multi-nationality and performance analysis is one approach to quantify whether firms can globalise but has concerns over how to measure performance and also whether revenue or other data are the best constructs to analyse. The disaggregation of firms into lines of business and also as a set of discrete value chain elements is a logical approach for these large firms ion this and other industries but may show intra-firm outcomes that suggest that many SIC level studies and their results are not informative as they are insufficiently granular. If performance measures cannot be found for this industry then the use of production volumes will allow analysis of comparative performance within the industry.

Study of competition over time and particularly concentration ratios at a regional level is another research line. Again, as Casson (2010), the theoretical position would be around visualising what Internalization Theory would predict. Perfect competition would again suggest low and standard concentration indices at the regional level but the outcome seen in the data suggests long-term advantages for the large firms.

One hypothesis is that legacy US/UK hegemony and the power of nation states affects profit levels and the term/duration of profit maximisation. There are also increasing extents of joint ventures and these could be measured. The Research operated here found data that could be extracted easily from secondary sources. This could in turn be used to investigate the comparative performance of forms and to subdivide this around forms of new market entry and in parallel differences in the results of firms that engage in joint venture and other operating models and those that do not.

The implications of global shifts for MNEs, in terms of strategic focus and practice, is a qualitative agenda not been addressed in the main IB literature. Case studies on the processes of internationalisation and interviews there from would augment the data analysis. Focus would include the realities of liabilities of foreignness for oil and gas firms and the idea that different competencies between different firms lead to different outcomes over time.

Conclusions

The research question tested for globalised oil and gas firms. It delivers a partial answer in that few firms by number are global by a definition common to the literature and there is no discernible movement towards global models of operations, for the majority of firms, in this sector across the last nine years. However the data also shows that business segments inside these firms show variations in generated returns over time and between regions. This might be attributable to different degrees of globalisation inside the firms themselves and may well reflect the governing theories of competition in markets such as monopoly control through vertical integration of the supply chain.

The asset- and location-specific nature of Upstream allows MNEs to generate monopoly profits over time whereas Downstream production is largely undifferentiated and substitutable. They are traded on a global basis as commodities and unless a localised capacity constraint exists there can be no long term firm advantage in refining or marketing. The corollary to this is that firm proprietary advantages in knowledge or brand alone will not generate monopoly profit indefinitely yet the majors have existed largely unchallenged for over a century. This leaves an unanswered question as to how they achieve this anti-Schumpeterian longevity and what the social and welfare costs of this hegemony have been.

NOTES

1.   Equity shares and models of alliance vary but are increasing in impact and number. They could be linked to performance (profit) for different ownership models in the oil firm value chain. Equity shares that exceed a UNCTAD threshold of 10% are assumed to offer a controlling position. Disaggregating equity stake contribution to earnings from the controlled subsidiaries gives a more consistent statement of revenues by region.

2.   The EPR (S-31) sample shows Showa Shell Sekiju (SSS) separately from Royal/Dutch Shell as taken in the Fortune Global 500 list. SSS is a Japanese refiner part-owned by RDS and in OneSource RDS is shown as the ultimate parent with a current share at 35%. The SSS result in Rugman (2005) is treated with the same significance as that of its parent.

3.   With no AP-domiciled firms in the pilot analysis S-10 some findings are preliminary and might change with a larger sample. In the S-31 and S-102 samples the AP region is better represented but overall they may offer neither sufficient large cases of MNEs to reflect their constituent percentage of the Global 500 nor enough public data to apply this method fully.

4.   Treatment of Russia as EU or AP region location is diverse and especially affects the analysis of the one Russian S-31 firm, Lukoil. As the former USSR was in effect one country when the RU forms were established, the segmented reporting of Russia alone is now anachronistic and hence these cases are treated as incomplete data in some analyses.

5.   The simplifying assumptions taken are that a) oil prices are comparable globally and b) refined products have the same finished price. There are in reality localised variations in oil and gas markets and also differences in refined product sales by geography and type.

6.   Part ownership illustrates a definition gap in the study of MNEs as there is no explicit ownership threshold for MNE control but they seek to deploy financial scale, geographic breadth and brand strength with part ownership of extant firms over green-field start-ups. Canadian G-500 firm Imperial Oil is now 66% owned by ExxonMobil and illustrates the point.

7.   There are data and geographic 'outliers' and their interpretation reflects different research questions. There are differences between Rugman (2005) and this work in interpretation of AF/ME/OC/LA/RU as Rugman (2005) retained the firm models which varied (e.g. McDonalds has AF/ME in Asia-Pacific) whereas here zone definitions are consistent.

8.   Firms show non-operating revenues such as asset sales, in annual earnings figures. Revenue data is used here so there are no 'one-off' effects likely other than in Table 6b. Significant changes on firm structure such as merger activity (Conoco and Phillips Petroleum and Statoil and the Oil & Gas business of Norsk Hydro) are treated case-by-case.

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NOTE TO EXAMINERS

The following list represents the corrections requested by the examiners and the responses made, contained in this revised version of the document.

"Address a modest ambiguity in the aims and objectives highlighted during the viva"

"Add an additional brief section offering additional detail on the choice of research design"

These aspects are presented in revised Chapters One and Two and an updated abstract. Linkage between the initial and subsequent research questions is made and is carried into Chapter Three where alternative options for data collection and analysis are now discussed. Use of qualitative analysis techniques, such as case study analysis of the strategic tensions between lines of business is introduced and informs the discussion of the research agenda.

"Deepen the final section by acknowledging the significance of two additional findings which were unreported in the existing chapter due in part to the ambiguity in aims and objectives

"Comment upon the implications of their work for theoretical development in the field"

The corrections to Chapters One and Two also address the correlation to theory which is extended by a new section at the end of Chapter Five retrospectively addresses the findings that there is limited support for multi-order regressions and that there are other factors that are as important as multi-nationality, such as firm size, for this particular industry.

PERSONAL REFLECTION

The M. Res. course has increased my awareness of academic life and brought the realisation that research now is the primary, perhaps sole, focus of most university staff. Dr. Ball suggested this in interview early in 2009 and it is only after 18 months that I can see how perceptive this comment was and perhaps how out of date was my own mental model. There were few moments of humour but finding 'invisible' data in a FY2003 Chevron annual report .PDF file showed that others are human too... as am I clearly, for why else would anyone list the French firm last by alphabet of the ten?

This research involved accessing company reports and other online sources. Annual reports of these firms run to hundreds of pages so in consideration of the natural environment – paper as a resource and electricity and consumables associated in printing – this research used only online access to these reports and did not print these documents. Further this Masters Research dissertation was never printed as hard copy in advance of its submission. I hope that all readers accept that any format errors here are less important than the trees saved in not correcting them and re-printing multiple copies.

APPENDIX ONE   **VALIDATION AND SELECTION CRITERIA**

The economic geography of oil requires further disaggregation to capture data for South America; Middle East; Russia; Africa and possibly Oceania in addition to NA, EU and AP. The trend is towards fewer segments being reported. Segment definitions vary over time so require re-aggregation of previous years for accurate longitudinal analysis. The regional split is adopted to report firm Oil and Gas Production for SEC reporting purposes to give annual volumes but only for the EP business segment. The largest revenues are in the RM business segment. It has a much wider product range but refining data rarely provides revenues split to geographic detail to match the EP analysis. The 'other' businesses include:

- Petrochemicals is declining, low value and part of RM at <<5% of total revenue *
- Gas and Power is increasing, material and addresses non-conventional supply into EP
- Oil Sands which is increasing but has been classified as a mining activity until 2005
- Corporate activities as Treasury are excluded as non-revenue at <<1% of revenue *
- Standalone operations (e.g. YPF in Repsol) have EP and RM revenues to include
- Global businesses as Aviation with no 'home' are excluded and are <<1% of revenue
- Trading is therefore excluded where reported but are generally <<1% of revenue *

         *   *The 'majors' are an exception and taken individually*

Year by year collation of report data is needed to avoid restatements and it is insufficiently accurate to take summary presentation data (e.g. RDS FAOI 2005-2009 across five years). Production in the oil industry is increasingly carried out on an Equity and/or Joint Venture basis and oil firms can have operator or non-operator revenues. Total volumes and where necessary revenues are taken at firm and segment independent of the ownership model. These principles allow allocation of reported revenue in the segment order below:

1.   RM revenue allocated on volume of oil products sold against geographic dispersion
Refineries as fixed assets define locations and hence regional volumes data is available in a consistent form over time. It also has a largely uniform price structure so extrapolations of prices between countries in a region and likely between regions is acceptable and accurate.
2.   EP revenue allocated against SEC reported quantities of oil/equivalents produced
This data is a standard regulatory reported item and is consistent with the regional model. Variations between firms in operations in oil and gas conversion factors are not material.
3.   All other revenue is taken case-by-case basis and usually allocated back into RM

Analysis of RM revenues is based on standardised product sets (e.g. gasoline/motor fuel) and mapped to yearly product volumes data. Complete mapping between all businesses inside the main segments and firm reported revenues is not possible but segments such as Renewable Energy address only fractional firm revenues and are thought to feature for CSR rather than materiality. Petrochemical revenue is calculated from product volumes and prices and taken back into the RM segment when not separated out by firms. The approach used here assumes standard pricing by year and region on a global basis. It is feasible, but complex, to do product-by-product and year-by-year analysis but as it only applies to a few regionally diverse firms, mainly the majors, it is not tested in this analysis. Two examples show firm then segment level application of this approach. Both use data recently reported data from SEC filings, which can be accessed directly at:
http://www.sec.gov/edgar/searchedgar/companysearch.html

Example A-1:   **Allocation of BP 2009 Revenue Data**

BP reports the following data elements in its 2009 Annual Report and SEC filings:

	$ million
By business	2009
Exploration and Production	57,626
Refining and Marketing	213,050
Other businesses and corporate	2,843
	273,519
Less: sales between businesses[a]	
Exploration and Production	32,540
Refining and Marketing	821
Other businesses and corporate	886
	34,247
Third party sales and other operating revenues	
Exploration and Production	25,086
Refining and Marketing	212,229
Other businesses and corporate	1,957
Total third party sales and other operating revenues	239,272
By geographical area[b]	
Non-US	173,822
US	87,283
	261,105
Less: sales between areas	21,833
	239,272

This allows us to work with the following values (*all million dollars and throughout*):

Total Revenue   = $ 273,519 $ 239,272 stated as third-party sales
EP Segment   = $ 57,626 $ 25,086 stated as third-party sales
RM Segment   = $ 213,050 $ 212,229 stated as third-party sales

This allows us to exclude all 'other' businesses such as Shipping and Renewable Energy, which in total generate less than 1% of revenue at $ 1,957 over $239,272 for materiality reasons, as per the assumption 7 in Chapter 4. Taking the RM segment first:

	2009
Sales	213,050
Replacement cost profit	743
Total assets	82,224
Capital expenditure	4,114
Total refinery throughputs	**2,287**
Global indicator refining margin	4.00
Refining availability	93.6%
Total chemicals production	**12,391**
	2009
Crude oil spot	35,625
Marketing refined products	166,088
Other sales revenues	11,337
	213,050

We treat the sales revenue of products as the $166,088 value and exclude as 'global' activity the crude oil volumes traded at $35,625. We also address the remaining $11,337 as the petrochemicals contribution, giving a total of Downstream for allocation of **$ 177,425.**

REGIONAL MARKETING SALES VOLUMES*	2009
USA	1,426
Europe	1,504
Rest of World	630
Total marketing sales	3,560
Trading/supply sales*	2,327
	5,887
	1,824
Total oil product sales	7,711

The destination of sales for these volumes allows us to generate a revenue split (as follows below) between the EU, NA and AP regions for the refined goods and petrochemicals elements. We should also verify that the assumption of location of refinery drives the right allocation of these elements and this is clearly sound as the bulk of the refining capacity is in the US and Northern Europe.

Refinery capacities at 31December 2009		%f	Total	Group share
US				
California	Carson*	100.0	265	265
Washington	Cherry Point*	100.0	234	234
Indiana	Whiting*	100.0	405	405
Ohio	Toledo*	50.0	160	80
Texas	Texas City*	100.0	475	475
			1,539	1,459
Europe				
Germany	Bayernoil	22.5	215	48
	Gelsenkirche	50.0	266	133
	Karlsruhe	12.0	323	39
	Lingen*	100.0	93	93
	Schwedt	18.8	226	42
Netherlands	Rotterdam*	100.0	386	386
Spain	Castellón*	100.0	110	110
			1,619	851
Rest of World				
Australia	Bulwer*	100.0	102	102
	Kwinana*	100.0	137	137
New Zealand	Whangerei	23.7	112	27
South Africa	Durban	50.0	180	90
			531	356
			3,689	2,666

This clearly now excludes the UK and reflects the commentary made in Chapter 5 regarding the effects of global lines of business, which remain home country reported but that may distort the real data and trend. For reference, there is also a 'one-off' effect with the BP purchase of Aral in Germany on 2002 and this explains the apparent movement towards the rest of region sales away from the UK. The information shown here does not provide a precise definition of sales against refining capacity as the net volumes of the RoW segment are less (at 356 tb/d) than the reported sales in that area (at 630 tb/d) but it is close enough to support the estimation approach.

Next we address the location of production for the EP segment revenues of **$57,626**:

RESULTS OF OPERATIONS FOR YEAR ENDED 31 DECEMBER		UK	Rest of Europe	USA	North Americas	South America	Africa	Russia	Asia Pacific	Australasia	Total
2009	Subsidiary	4,721	877	16,072	583	2,934	7,159	–	6,893	1,511	40,750
	Equity	–	–	–	–	1,977	–	7,757	351	–	10,085
	Overall	4,721	877	16,072	583	4,911	7,159	7,757	7,244	1,511	50,835

Again though to ensure consistency of definitions we need to review the location of production of each element of this reported data. The last detail below shows some of this data for BP production in 2009, including the helpful split of the non-US based production:

Colombia	Various	Various	23
Trinidad	Various	100	38
Venezuela	Various	Various	–
Total South America			61
Angola	Girassol	16.7	70
	Xikomba	26.7	43
	Kizomba	26.7	32
	Other	Various	22
			44
Total Angola			211
Egypt	Various	Various	55
			16
Total Egypt			71
Algeria			22
Total Africa			304
Azerbaijan	Azeri-Chir	34.1	94
			7
Total Azerbaijan			101
Western Indonesia[b]			5
Other	Various	Various	17
Total Rest of Asia			123
Total Asia			123
Australia	Various	15.8	31
Total Australasia			31
Total Group			1,400
Equity-accounted entities			
Russia	Various	Various	840
			840
Abu Dhabi	Various	Various	182
			12
			194
			1,034
Argentina	Various	Various	75
			25
			1
Other	Various	Various	101
Total equity-accounted entities			1,135
			2,535

This production 'key' is important and has to be repeated for each firm where this level of analysis is required and has to be made constant across nine years of data. However, from analysis of the S-102 sample it appears that the most complex firms are the largest and these are the firms addressed in the S-10 analysis. This is explained further in the second example that follows.

We can now apply these segregations to the revenue values as follows:

Region	Downstream 177,425		Upstream 57,626		Overall 235,051	%
EU	42.2%	74,957	7.9%	4,574	79,531	**33.8%**
NA	40.1%	71,070	44.4%	25,612	96,682	**41.1%**
AP	17.7%	31,398	47.6%	27,440	58,838	**25.0%**
US		*71,070*		*15,341*		

These are naturally only *estimations* and are open to other interpretations but there is some opportunity for validation. For BP the process is to review the reported geographic segment data which is US and non-US revenues. By retracting the non-US elements of the Upstream revenue we arrive at an indicative percentage of 36.8% of FY2009 revenue which is close to the reported value of 33.4% given in the Annual Report.

However, if we were to exclude the global Traded volumes from the reported data – as we have with this revised analysis – then that value of 33.4% moves to 38.7% which is the other side of our estimate. This indicates that the value achieved is accurate to +/- 3% in this specific case and certainly accurate enough for the parameterisation after Rugman (2005). Equally the trend analyses that use the nine years of data generated will be accurate as the errors there will be common and constant and hence will cancel out broadly over time.

Reviewing the other assumptions, the issue of materiality of petrochemicals and other business seems accurately estimated at +/- 1% as they are here only 4% of overall revenue. The BP 2009 Annual Report suggests that there is a move towards Asia in production and sales so this is perhaps under-estimated by the method applied here but as always this method assumes home region based revenues as the default or minimum level option.

One other assumption stated in the analysis is evidenced here – that of the materiality of production in the zones outside of the core EEC, NAFTA and ASEAN areas, with special cases designated for allocation of revenues from RU, ME, OC, LA and AF. BP has the largest capacity of the majors in Russia as a result of its TNK operations but that still only accounts for some 3.6% of its revenue for FY2009.

Example A-2:   Disaggregation of Non-Specific Region Data at Segment Level

This example shows the typical complexity of the country allocation of production volumes between years. Summarised, this was a reported element named 'Other' and typified the range of geographical segment models used by firms which did not conform to the NA/EU/AP division but could be deconstructed country by country and then added back.

Key points include the differences between the products which are summated in most reports to BOE comprising Crude, Natural Gas and Gas Liquids. This uses an industry standard conversion factor (5.8 million cu. ft. of gas) but investigation using price data shows that even this is not reliable as the range of oil and gas prices moves enough to affect the 'real' value of this combined product. This analysis uses price data for both oil and gas to test differences and estimate the effect for other samples.

OTHER	CRUDE & GAS LIQUIDS		NATURAL GAS	OIL EQUIVALENT		Value	%	Revenue
UK	73		222	110				
Netherlands	2		41	9				
Norway	5		1	5				
Denmark	35		119	55				
EU	115 ʳ	2349	383	179	561	2910	46.6%	$ 3,281
Australia	35		434	108				
AP	35 ʳ	715	434	108	635	1350	21.6%	$ 1,523
Colombia	—		245	41				
Argentina	33		27	38				
Trinidad	1		199	34				
Brazil	2		—	2				
SA	36 ʳ	735	471	115	689	1425	22.8%	$ 1,607
Canada	27		4	28				
Oil Sands	26		0	26				
NA	27 ʳ	552	4	28	6	557	8.9%	$ 629
Total	213 ʳ	4351	1292	456	1891	6242	100.0%	

Liquids	($/Bbl)	by365 $ 55.97		20.43	
Gas	($/MCF)	by365 $ 4.01		1.46	
					$ 7,039

Equity	Oil	Gas
TCO	226	289
Venezuela	54	23
	280	312

WORKED EXAMPLE FOR CHEVRON EP OVERSEAS

This process also addresses other equity investments and non-subsidiary joint ventures. These are valid production volumes and have country/regional relevance especially given the open-ended definition of an MNE such as the 10% equity threshold suggested by UNCTAD. Production outside direct control is can still be allocated and whilst not significant in overall terms it requires inclusion for consistency. (NB: Chevron use the term 'Total Consolidated Operations' as do most firms but also it also has an equity stake in Kazakhstan with the acronym TCO ("TengizChevronOil"), which might cause confusion.)

Data entry is a time consuming aspect of this work. Great effort was required to align the order and allocation of countries to regions as firm approaches may vary year on year for firms as organisational focus changes and even the order in which countries are listed can alter. This analysis built data for FY2001 to FY2009 that is consistent and has all 'Other' definitions disaggregated from company reports and this will support future doctoral work.

Additional Chevron data on 2009 sales allowed a subsequent comparison to the outcome below and matched to +/- 2% accuracy. Investigation of the effects of price differentials between regions is needed at doctoral level to validate this approach but with the dominance of home region firms the effects are limited to a few firms. Firms with inter-regional revenues report prices by geography and this can be checked with mechanisation by spreadsheet.

Additional Methodology Notes

Intra-segment sales are significant values and involve potential transfer pricing effects. They represent production volumes and firms take market prices for products or agreed cross-segment prices. This is avoided here by addressing volumes. Intra-plant sale of petro-chemicals also occurs and transfer pricing is again a potential issue but this is not significant if it is retained and reported within the RM segment.

Upstream (EP) revenues mix third-party sales, international transfers and revenues paid in lieu of service. Firms are operators for national oil companies and these volumes are often not sold on the open market but as part of a production sharing agreement where the operator is paid in oil. The operator transfers this to facilities or takes the revenue. Internal and external sales are thus reported as equal by firms.

Excise duties are a significant element of fuel sales revenues in many countries. Oil firms act as tax collectors on behalf of the state. This is not revenue attributable to the oil firms and is removed from all reported revenue figures. The normal convention is for oil firms to report both figures. The Fortune 500 Lists excludes all excise duties in its data for firms.

An industry specific principle is 'Current Cost of Supply' (CCS), which is the way that firms report annual sales and volumes given variations in oil prices through a year. All data from company reports is assumed to be at CCS unless otherwise stated.

Variations in price for different types of crude are another factor of regional supply and demand – for example the 'sweet' crudes of Libya (a term used for low sulphur products which are better for the ever higher environmental standards of motor fuels) carry a market premium. The increasing sophistication of refineries and the ability to blend crude intakes for run optimisation reduces price differentials. A single global price has been assumed when deriving relative percentages of revenues on an intra-regional basis.

The nature of the businesses in Downstream varies extensively and this segment is a home for non-core operations that do not fit with a refinery – distribution – marketing value chain. For example, RDS currently operates Aviation, Lubricants, Renewable Energy and Engineering Services all under this single segment. Materiality is an important factor and in comparative firm analyses at regional level estimation is acceptable. They comprise at most 5% of downstream revenue and are widely dispersed so do not affect the validity.

Within the sales of refined products there is a significant element termed 'export' sales. This is arguably also a global sale as it represents commodities traded on the market with no known end-user or destination at sale. The approach for refined products is to allocate them to a country of sale hence the approach for export sales is to exclude these volumes from the first allocation analysis but assume a similar geographical distribution of this product as with the named product sales for the allocation of the revenue.

INTEGRATED (39)	EXPLORATION (32)	REFINING (23)
1. ExxonMobil Corp (1)	1. EnCana Corp (16)	1. Reliance Industries (25)
2. Chevron Corp (2)	2. CNOOC Ltd (21)	2. Indian Oil Corp (33)
3. Royal Dutch Shell (3)	3. Oil & Natural Gas (26)	3. Tonen General Sekiyu (56)
4. BP (4)	4. Anadarko Petroleum (39)	4. Sunoco Inc (59)
5. Total SA (5)	5. Canadian Natural Resources (42)	5. SK Energy Corp (74)
6. Petrobras Brasileiro (6)	6. Talisman Energy Inc (53)	6. ERG SpA (76)
7. Rosneft Oil (7)	7. EOG Resources Inc (61)	7. Bharat Petroleum (97)
8. Gazprom OaO (8)	8. XTO Energy Inc (69)	8. Formosa Petrochemical (113)
9. Petrochina Corporation (9)	9. Inpex Holdings Inc (75)	9. S-Oil Corp (120)
10. ENI SpA (10)	10. Nexen (80)	10. Tupras (132)
11. StatoilHydro (11)	11. Woodside Petroleum (85)	11. Nippon Oil Corp (136)
12. LUKOIL (12)	12. Noble Energy Inc (92)	12. Valero Energy Corp (138)
13. TNK-BP (13)	13. PTT Exploration (102)	13. Hindustan Petroleum (147)
14. Occidental Petroleum (15)	14. Apache Corp (109)	14. Tesoro Corp (150)
15. BG Group plc (17)	15. Canadian Oil Sands Trust (110)	15. Idemitsu Kosan (152)
16. Marathon Oil (20)	16. Chesapeake Energy Corp (111)	16. GS Holdings Corp (164)
17. Repsol YPF SA (22)	17. Santos Ltd (115)	17. Nippon Mining Holdings (171)
18. China Petroleum (23)	18. Penn West Energy Trust (118)	18. PKN ORLEN (176)
19. Gazprom Neft (24)	19. Addax Petroleum Corp (126)	19. Cosmo Oil Co (180)
20. Hess Corp (28)	20. Novatek OaO (151)	20. Showa Shell Sekiyu KK (186)
21. Surgutneftegas OaO (29)	21. Enerplus Resources Fund (160)	21. Neste Oil oyj (210)
22. Ecopetrol SA (30)	22. Linn Energy LLC (162)	22. NuStar (227)
23. Imperial Oil Ltd (31)	23. Southwestern Energy Co (166)	23. Hellenic Petroleum SA (235)
24. OMV AG (32)	24. OAO Tatneft (172)	
25. Husky Energy Inc (35)	25. Devon Energy Corp (175)	
26. Petro-Canada (37)	26. Arc Resources (193)	
27. Sasol Ltd (43)	27. Encore Acquisition Co (198)	
28. Murphy Oil Corp (44)	28. Denbury Resources Inc (204)	
29. PTT Plc (46)	29. Tullow Oil plc (212)	
30. Suncor Energy Inc (48)	30. Pengrowth Energy Trust (222)	
31. YPF SA (83)	31. Range Resources Corp (225)	
32. MOL (88)	32. Pioneer Natural Resource (249)	
33. ConocoPhillips (117)		
34. CEPSA (119)		
35. SNP Petrom (169)		
36. GALP Energia SGPS (179)		
37. Polish Oil & Gas (196)		
38. Origin Energy Ltd (201)		
39. Petrobras Energia SA (236)		

To which are added:

Chinese Petroleum (CPC)	TAIWAN
Japan Energy Corporation	JAPAN
PDVSA	VENEZUELA
Pemex	MEXICO
Petronas	MALAYSIA
Sinopec	CHINA
SK Holdings	KOREA S

Company	Country	Revenes USD (mil)	Staff	Assets USD (mil)
1 Exxon Mobil Corporation	United States	310,586	80,700	233,323
2 Royal Dutch Shell plc	Netherlands	278,188	101,000	292,181
3 BP plc	United Kingdom	243,965	80,300	235,968
4 China Petroleum & Chemical Corporation	China	196,904	371,333	126,919
5 Chevron Corporation	United States	171,636	64,000	164,621
6 TOTAL S.A.	France	155,975	96,387	183,294
7 ConocoPhillips	United States	152,840	29,900	152,588
8 Eni S.p.A.	Italy	117,301	78,417	168,625
9 Gazprom OAO	Russian	94,654	386,000	275,891
10 Petroleo Brasileiro SA - Petrobras	Brazil	91,406	76,919	198,260
11 Neftyanaya kompaniya LUKOIL OAO	Russian	81,083	114,000	79,019
12 Statoil ASA	Norway	74,022	28,739	97,431
13 Valero Energy Corporation	United States	68,144	21,000	35,629
14 Repsol YPF SA	Spain	67,521	41,127	83,335
15 SK Holdings Co, Ltd.	Korea, Republic	64,378	298	63,316
16 Marathon Oil Corporation	United States	54,139	28,855	47,052
17 PTT Public Company Limited	Thailand	46,201	11,354	33,101
18 Rosneft' NK OAO	Russian	38,898	50,500	60,023
19 SK Energy Co., Ltd.	Korea, Republic	34,368	5,582	21,183
20 Sunoco, Inc.	United States	31,312	11,200	11,895
21 Hess Corp.	United States	29,569	13,300	29,465
22 COSMO OIL COMPANY, LIMITED	Japan	28,105	6,561	17,605
23 GS Holdings Corp.	Korea, Republic	27,058	24	21,916
24 Bharat Petroleum Corporation Ltd	India	26,588	14,016	12,203
25 Compania Espanola de Petroleos SA	Spain	25,602	11,911	14,846
26 Enterprise Products Partners L.P.	United States	25,511	3,300	26,152
27 OMV AG	Austria	24,918	32,484	30,725
28 Hindustan Petroleum Corporation Limited	India	23,873	11,246	11,073
29 Surgutneftegaz OAO	Russian	23,166	96,171	37,933
30 Oil & Natural Gas Corporation Limited	India	22,558	33,035	37,257
31 Suncor Energy Inc.	Canada	22,336	12,978	66,529
32 Polski Koncern Naftowy ORLEN S.A. (PKN ORLEI	Poland	21,814	22,535	17,179
33 KazMunayGas	Kazakhstan	21,088	30,000	
34 Formosa Petrochemical Corporation	Taiwan	19,247	6,275	14,051
35 Murphy Oil Corporation	United States	19,012	3,261	12,756
36 PKN Orlen s.a.	Poland	18,170	19,976	
37 Ultrapar Participacoes SA	Brazil	18,068	6,459	6,362
38 Tesoro Corporation	United States	16,872	5,500	8,070
39 MOL Magyar Olaj- es Gazipari Nyrt.	Hungary	16,664	34,135	22,455
40 Sasol Limited	South Africa	15,272	33,318	18,885
41 Petroplus Holdings AG	Switzerland	14,798	2,845	6,678
42 Empresa Colombiana de Petróleos S.A.	Colombia	14,128	5,850	
43 Neste Oil Corporation	Finland	13,441	5,183	8,178
44 Husky Energy Inc.	Canada	13,214	4,272	25,082
45 Israel Corporation Limited	Israel	12,498	9,914	12,147
46 Tatneft' imeni V.D. Shashina OAO	Russian	12,013	80,560	16,354
47 Delek Group Ltd.	Israel	11,071	2,803	22,269
48 Enbridge Inc.	Canada	10,928	6,065	26,870
49 Antarchile SA	Chile	9,948	7	16,147
50 Hellenic Petroleum S.A.	Greece	9,397	3,708	8,269

APPENDIX THREE   SAMPLE ONESOURCE EXTRACT

	31-Dec-09	31-Dec-08	31-Dec-07	31-Dec-06	31-Dec-05
Financial Strength					
Current Ratio (?)	1.17	0.95	0.86	0.87	0.82
Quick/Acid Test Ratio (?)	0.77	0.67	0.66	0.63	0.62
Working Capital (?)	1,137.00	-398	-1,098.00	-891	-1,157.00
Long Term Debt/Equity (?)	0.32	0.31	0.4	0.46	0.6
Total Debt/Equity (?)	0.33	0.32	0.41	0.46	0.6
Long Term Debt/Total Capi	0.24	0.23	0.28	0.31	0.37
Total Debt/Total Capital (?	0.25	0.24	0.29	0.32	0.38
Payout Ratio (?)	17.51%	5.44%	6.83%	5.93%	9.26%
Effective Tax Rate (?)	46.98%	49.82%	48.94%	52.55%	44.30%
Total Capital (?)	17,851.00	16,262.00	13,754.00	11,919.00	10,071.00
Efficiency					
Asset Turnover (?)	1.02	1.5	1.32	1.38	1.31
Inventory Turnover (?)	16.58	24.58	21.39	22.75	24.88
Days In Inventory (?)	22.01	14.85	17.07	16.04	14.67
Receivables Turnover (?)	7.19	9.12	7.46	7.63	7.49
Days Receivables Outstan	50.74	40.02	48.93	47.84	48.74
Revenue/Employee (?)	2,223,233	3,041,704	2,406,316	2,096,204	1,816,328
Operating Income/Employ	114,436	347,926	287,594	295,328	171,953
EBITDA/Employee (?)	283,910	498,222	406,090	384,672	252,031
Profitability					
Gross Margin (?)	23.12%	23.57%	24.00%	20.28%	15.39%
Operating Margin (?)	5.15%	11.44%	11.95%	14.09%	9.47%
EBITDA Margin (?)	12.77%	16.38%	16.88%	18.35%	13.88%
EBIT Margin (?)	5.15%	11.44%	11.95%	14.09%	9.47%
Pretax Margin (?)	5.15%	11.44%	11.95%	14.09%	9.47%
Net Profit Margin (?)	2.50%	5.75%	5.72%	6.53%	5.07%
R&D Expense/Revenue (?)	2.80%	1.77%	1.61%	1.92%	1.71%
COGS/Revenue (?)	76.99%	76.56%	75.34%	73.69%	77.63%
SG&A Expense/Revenue (?)	5.60%	4.13%	4.87%	4.91%	5.16%
Management Effectiveness					
Return on Assets (?)	2.78%	8.61%	8.04%	9.24%	6.92%
Return on Equity (?)	5.76%	21.38%	20.45%	26.02%	19.87%
Valuation					
Free Cash Flow/Share (?)	0.39	0.77	0.15	-1.12	-1.79
Operating Cash Flow/Shar	9.31	14.37	11.31	11.08	6.59

	31-Dec-09		31-Dec-08		31-Dec-07	
United States	24,611.00	83.10%	33,202.00	80.70%	25,530.00	80.50%
Europe	1,771.00	6%	3,488.00	8.50%	2,647.00	8.30%
Africa	1,898.00	6.40%	3,173.00	7.70%	2,443.00	7.70%
Asia and Other	1,334.00	4.50%	1,271.00	3.10%	1,107.00	3.50%
Segment Total	29,614.00	100%	41,134.00	100%	31,727.00	100%
Consolidated Total	29,614.00	100%	41,134.00	100%	31,727.00	100%

CORRELATION MATRICES

		ROS	RSTS	RSTS SQRD	RSTS CUBD	LOG REV	Oil Price	MULTI OIL
Pearson Correlation	ROS	1.000						
	RSTS	.532**	1.000					
	RSTSSQRD	.541**	.991**	1.000				
	RSTSCUBD	.543**	.968**	.993**	1.000			
	LOGREV	-.115	-.702**	-.671**	-.633**	1.000		
	Oil Price	.181	-.074	-.080	-.090	.373**	1.000	
	MULTIOIL	.466**	.484**	.462**	.430**	-.066	.799**	1.000

* Correlation is significant at the 0.05 level (1-tailed)
** Correlation is significant at the 0.01 level (1-tailed)

	Oil Price	ROA	ROS	LOG REV	SQR REV	PROFIT	RSTS	RSTS SQRD	RSTS CUBD	RSTS QUAD
Oil Price	1									
ROA	.356**	1								
ROS	.181	.863**	1							
LOGREV	.373**	.128	-.115	1						
SQRREV	.392**	.103	-.174	.975**	1					
PROFIT	.503**	.489**	.232*	.802**	.847**	1				
RSTS	-.074	.321**	.532**	-.702**	-.750**	-.478**	1			
RSTSSQRD	-.080	.343**	.541**	-.671**	-.713**	-.454**	.991**	1		
RSTSCUBD	-.090	.361**	.543**	-.633**	-.670**	-.426**	.968**	.993**	1	
RSTSQUAD	-.104	.375**	.539**	-.594**	-.625**	-.396**	.937**	.974**	.994**	1

* Correlation is significant at the 0.05 level (1-tailed).
** Correlation is significant at the 0.01 level (1-tailed)

TABLE ONE: ONESOURCE RECREATION OF S-31 (EPR) FIRMS FOR FY2001

FY2001 31 FY2008 29		HOME COUNTRY	REGION	F/T	COUNTRY REVENUE US$	%	REGION REVENUE US$	%	WEIGHTED REVENUE US$	REVENUE US$	CAT
BP		UK	EU	80.4	$ 34,143	19.6%	$ 63,235	36.3%	$ 174,200	$ 174,200	B
Chevron		US	NA	56.5	$ 43,370	43.5%	$ 43,370	43.5%	$ 99,700	$ 99,700	I
China National Petroleum		CHINA	AP	na	na	na	na	na	na	$ 41,500	N
ConocoPhillips	Conoco	US	NA	42.4	$ 18,893	57.6%	$ 18,893	57.6%	$ 32,800	$ 32,800	D
	Phillips	US	EU	9.1	$ 21,998	90.9%	$ 21,998	90.9%	$ 24,200	$ 24,200	D
Cosmo Oil		JAPAN	AP	9.9	$ 9,551	90.1%	$ 9,551	90.1%	$ 10,600	$ 10,600	D
ENI		ITALY	EU	44.3	$ 24,842	55.7%	$ 35,858	80.4%	$ 44,600	$ 44,600	D
Exxon Mobil		US	NA	69.8	$ 57,863	30.2%	$ 71,850	37.5%	$ 191,600	$ 191,600	I
Hess		US	NA	26.8	$ 9,809	73.2%	$ 9,809	73.2%	$ 13,400	$ 13,400	D
Idemitsu Kosan		JAPAN	AP	na	na	na	na	na	na	$ 15,700	N
Indian Oil		INDIA	AP	na	na	na	na	na	na	$ 20,900	N
Lukoil		RUSSIA	EU	na	na	na	na	na	na	$ 12,100	N
Marathon Oil		US	NA	3.6	$ 33,740	96.4%	$ 33,740	96.4%	$ 35,000	$ 35,000	D
Nippon Oil		JAPAN	AP	19.2	$ 18,988	80.8%	$ 20,657	87.9%	$ 23,500	$ 23,500	D
Occidental Petroleum		US	NA	13.2	$ 12,239	86.8%	$ 12,366	87.7%	$ 14,100	$ 14,100	D
Petrobras		BRAZIL	NA	12.0	$ 21,560	88.0%	$ 21,560	88.0%	$ 24,500	$ 24,500	D
Repsol YPF		SPAIN	EU	na	na	na	na	na	na	$ 39,100	N
Royal Dutch Shell		NETHERLAN	EU	na	na	na	$ 62,327	46.1%	$ 135,200	$ 135,200	I
Showa Shell Sekiyu		JAPAN	AP	12.4	$ 9,110	87.6%	$ 9,443	90.8%	$ 10,400	$ 10,400	D
Statoil Hydro	Statoil	NORWAY	EU	24.6	$ 19,830	75.4%	$ 22,828	86.8%	$ 26,300	$ 26,300	D
	Hydro	NORWAY	EU	91.8	$ 1,394	8.2%	$ 13,090	77.0%	$ 17,000	$ 17,000	D
Sunoco		US	NA	na	na	na	$ 12,400	100.0%	$ 12,400	$ 12,400	D
Total		FRANCE	EU	na	na	na	$ 52,431	55.6%	$ 94,300	$ 94,300	D
Valero Energy		US	NA	na	na	na	$ 15,000	100.0%	$ 15,000	$ 15,000	D
							$ 550,404 55.1%		$ 998,800	$1,128,100	
BHP Billiton		AUSTRALIA	AP	67.9	$ 5,714	32.1%	$ 11,766	66.1%	$ 17,800	$ 17,800	D
Japan Energy Corporation		JAPAN	AP	na	na	na	na	na	na	$ 13,200	N
PDVSA		VENEZUELA	NA	na	na	na	na	na	na	$ 46,300	N
Pemex		MEXICO	NA	34.4	$ 25,846	65.6%	$ 36,130	91.7%	$ 39,400	$ 39,400	D
Petronas		MALAYSIA	AP	na	na	na	na	na	na	$ 17,700	N
Sinopec		CHINA	NA	na	na	na	na	na	na	$ 40,400	N
SK Holdings		KOREA S	AP	na	na	na	na	na	na	$ 33,000	N
							$ 47,896		$ 57,200	$ 207,800	
							$ 598,300 56.7%		$ 1,056,000	$1,335,900	

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TABLE TWO: ONESOURCE ANALYSIS OF S-31 FIRMS FOR FY2008

	HOME COUNTRY	REGION	WEIGHTED COUNTRY REVENUE US$	COUNTRY REVENUE varies	%	REGION	WEIGHTED REGION REVENUE US$	REGION REVENUE varies	%	WEIGHTED TOTAL REVENUE US$	TOTAL REVENUE varies
BP	UK	EU	$ 81,773	$ 81,773	22.6%	EU	$ 163,804	$ 163,804	45.4%	$ 361,143	$ 361,143
Chevron	US	NA	$ 84,145	$ 84,145	42.6%	NA	$ 90,949	$ 90,949	46.0%	$ 197,716	$ 197,716
China National Petroleum	CHINA	AP	$ 212,840	$ 212,840	100.0%	AP	$ 212,840	$ 212,840	100.0%	$ 212,840	$ 212,840
ConocoPhillips	US	NA	$ 166,496	$ 166,496	69.1%	NA	$ 171,722	$ 171,722	71.3%	$ 240,842	$ 240,842
Cosmo Oil	JAPAN	AP	$ 27,009	$ 27,009	96.1%	AP	$ 28,105	$ 28,105	100.0%	$ 28,105	$ 28,105
ENI	ITALY	EU	$ 55,696	€ 42,843	39.6%	EU	$ 112,485	€ 86,527	80.1%	$ 140,507	€ 108,082
Exxon Mobil	US	NA	$ 137,615	$ 137,615	29.9%	NA	$ 171,292	$ 171,292	37.3%	$ 459,579	$ 459,579
Hess	US	NA	$ 33,233	$ 33,233	80.8%	NA	$ 33,233	$ 33,233	80.8%	$ 41,134	$ 41,134
Idemitsu Kosan	JAPAN	AP	$ 19,760	$ 19,760	94.1%	AP	$ 19,760	$ 19,760	94.1%	$ 20,999	$ 20,999
Indian Oil	INDIA	AP	$ 48,858	$ 48,858	90.0%	AP	$ 53,744	$ 53,744	99.0%	$ 54,287	$ 54,287
Lukoil	RUSSIA	EU	na	$ 20,043	18.6%	AP	na	na	na	$ 107,680	$ 107,680
Marathon Oil	US	NA	$ 69,034	$ 69,034	89.9%	NA	$ 69,856	$ 69,856	91.0%	$ 76,754	$ 76,754
Nippon Oil	JAPAN	AP	$ 73,718	$ 73,718	86.8%	AP	$ 82,210	$ 82,210	96.8%	$ 84,928	$ 84,928
Occidental Petroleum	US	NA	$ 15,258	$ 15,258	63.0%	NA	$ 15,258	$ 15,258	63.0%	$ 24,217	$ 24,217
Petrobras	BRAZIL	NA	$ 106,350	$ 106,350	72.6%	NA	$ 106,350	$ 106,350	72.6%	$ 146,529	$ 146,529
Repsol YPF	SPAIN	EU	$ 37,172	€ 28,594	47.4%	EU	$ 45,193	€ 34,764	57.6%	$ 78,478	€ 60,368
Royal Dutch Shell	NETHERLANDS	EU	$ 36,669	$ 36,669	8.0%	EU	$ 196,968	$ 196,968	43.0%	$ 458,361	$ 458,361
Showa Shell Sekiyu	JAPAN	AP	$ 33,725	€ 33,725	90.1%	AP	$ 33,725	$ 33,725	90.1%	$ 37,431	$ 37,431
Statoil Hydro	NORWAY	EU	$ 92,303	€ 71,002	66.9%	EU	$ 106,524	€ 81,941	77.2%	$ 138,068	€ 106,206
Sunoco	US	NA	$ 50,473	$ 50,473	99.0%	NA	$ 50,983	$ 50,983	100.0%	$ 50,983	$ 50,983
Total	FRANCE	EU	$ 60,709	$ 60,709	24.2%	EU	$ 175,904	$ 175,904	70.2%	$ 250,509	$ 250,509
Valero Energy	US	NA	$ 82,168	$ 82,168	86.2%	NA	$ 90,310	$ 90,310	94.7%	$ 95,327	$ 95,327
			$ 1,525,004				$ 2,031,216			$ 3,198,737	
			47.7%				63.5%				

TABLE THREE: S-10 DATA AS RUGMAN (2005) AND REBASED TO NEW FY2001 DATA

FY 2001	Rugman 2005 Data						Alternative Analysis					US$ BILLIONS
Firm	Revenue	NA/T %	EU/T %	AP/T %	Class	Notes	Revenue	NA/T %	EU/T %	AP/T %	Class	Comments
BP	174.2	48.1	36.3	na	B	US only	174.2	42.0	44.0	14.0	B	Confirmed
Chevron	99.7	43.5	na	na	I	US only	99.7	43.5	16.0	40.5	B	Now identified as Bi-Regional
ConocoPhillips												
Conoco	32.8	57.6	na	na	D	US only	32.8	x	x	x	x	Merged in 2002
Phillips	24.2	90.9	na	na	D	US only	24.2					
ENI	44.6	12.1	80.4	3.1	D	Americas	44.6	4.5	78.9	16.6	D	Confirmed
Exxon Mobil	191.6	37.5	8.9	10.4	I	US/Canada; UK; Japan	191.6	47.3	27.3	25.4	C	Now identified as Global
Repsol YPF	39.1	na	na	na	N		39.1	39.4	60.6	0.0	D	Could also identify as Bi-Regional
Hess	13.4	73.2	23.7	na	D	US only	13.4	73.2	23.4	3.4	D	Confirmed
Royal Dutch Shell	135.2	15.6	46.1	na	I	US only	135.2	30.4	46.0	23.6	C	Now identified as Global
Statoil												
Statoil	26.3	10	86.8	na	D	US only	26.3	x	x	x	x	Merged in 2007
Norsk Hydro	17	11.8	77	4.2	D	US/Canada	17					
Total	94.3	8.4	55.6	na	D		94.3	8.4	55.6	36.0	D	Could also identify as Bi-Regional

TABLE THREE (cont'd): S-10 DATA REBASED FOR FY2001 AND FY2009

FY 2001 — Alternative Analysis FY2001 (US$ BILLIONS)

Firm	Region	Revenue US$	Home %	RoR %	F/T %	R/T %	RoW %	Class
BP	EU	174.2	23.2	20.8	76.8	44.0	56.0	B
Chevron	NA	99.7	43.4	0.1	56.6	43.5	56.5	I
ConocoPhillips / Conoco / Phillips	NA / NA / NA	x	x	x	x	x	x	x
ENI	EU	44.6	55.7	23.2	44.3	78.9	21.1	D
Exxon Mobil	NA	191.6	30.4	16.9	69.6	47.3	52.7	I
Repsol YPF	EU	39.1	60.6	0.0	39.4	60.6	39.4	N
Hess	NA	13.4	73.2	0.0	26.8	73.2	26.8	D
Royal Dutch Shell	EU	135.2	6.8	39.2	93.2	46.0	54.0	I
Statoil / Statoil / Norsk Hydro	EU / EU	x	x	x	x	x	x	x
Total	EU	94.3	20.9	34.7	79.1	55.6	44.4	D

FY 2009 — Analysis FY2009 (US$ BILLIONS)

Firm	Region	Revenue US$	Home %	RoR %	F/T %	R/T %	RoW %	Class	Notes
BP	EU	273.5	19.2	15.7	80.8	34.9	65.1	C	
Chevron	NA	171.6	42.4	3.6	57.6	46.0	54.0	B	
ConocoPhillips	NA	149.3	65.4	2.9	34.6	68.3	68.3	D	
ENI	EU	105.7	30.0	39.1	70.0	69.1	30.9	D	
Exxon Mobil	NA	301.5	29.8	15.3	70.2	45.1	54.9	C	
Repsol YPF	EU	60.0	51.2	9.4	48.8	60.6	39.4	D	
Hess	NA	29.6	83.1	0.0	16.9	83.1	16.9	D	
Royal Dutch Shell	EU	278.2	6.5	30.7	93.5	37.2	62.8	C	
Statoil	EU	74.2	77.9	13.4	22.1	91.3	8.7	D	
Total	EU	166.8	24.7	45.8	75.3	70.5	29.5	D	

TABLE FOUR: INTRA-FIRM ANALYSIS: EXXONMOBIL BY MAJOR SEGMENTS

Firm	Home	Region	Year	LOB	Home ROR	F/T	Int	NA/T	EU/T	AP/T	ROW	C	Notes
Exxon	US	NA	2010	EP									
				RM									
Exxon	US	NA	2009	EP	13.8%	9.0%	86.2%	22.8%	22.8%	25.7%	51.5%	77.2%	G
				RM	39.3%	10.8%	60.7%	50.0%	50.0%	25.3%	24.7%	50.0%	
Exxon	US	NA	2008	EP	14.4%	9.9%	85.6%	24.2%	24.2%	27.7%	48.0%	75.8%	G
				RM	37.6%	12.8%	62.4%	50.3%	50.3%	25.3%	24.3%	49.7%	
Exxon	US	NA	2007	EP	14.7%	10.0%	85.3%	24.6%	24.6%	26.4%	49.0%	75.4%	G
				RM	38.3%	12.8%	61.7%	51.1%	51.1%	25.0%	24.0%	48.9%	
Exxon	US	NA	2006	EP	15.5%	10.8%	84.5%	26.3%	26.3%	28.7%	45.0%	73.7%	G
				RM	37.7%	13.0%	62.3%	50.7%	50.7%	25.0%	24.3%	49.3%	
Exxon	US	NA	2005	EP	19.9%	12.1%	80.1%	32.1%	32.1%	29.7%	38.3%	67.9%	G
				RM	37.5%	12.9%	62.5%	50.4%	50.4%	24.3%	25.3%	49.6%	
Exxon	US	NA	2004	EP	22.6%	12.3%	77.4%	34.9%	34.9%	31.2%	33.9%	65.1%	G
				RM	35.0%	13.6%	65.0%	48.6%	48.6%	26.1%	25.3%	51.4%	
Exxon	US	NA	2003	EP	25.3%	12.5%	74.7%	37.8%	37.8%	31.6%	30.6%	62.2%	G
				RM	34.3%	13.7%	65.7%	48.0%	48.0%	25.9%	26.1%	52.0%	
Exxon	US	NA	2002	EP	24.4%	11.6%	75.6%	36.0%	36.0%	33.3%	30.7%	64.0%	G
				RM	35.2%	14.1%	64.8%	49.3%	49.3%	26.3%	24.4%	50.7%	
Exxon	US	NA	2001	EP	28.9%	10.7%	71.1%	39.6%	39.6%	34.6%	25.8%	60.4%	G
				RM	34.5%	14.0%	65.5%	48.5%	48.5%	26.1%	25.4%	51.5%	

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TABLE FIVE: **DETAIL OF EP SEGMENT REGIONAL VOLUMES FY2001 TO FY2009 (as per FIGURE X)**

Company	Year	Home	Home %	Europe	Europe %	Asia	Australia/ Oceania	Middle East	Russia/ CIS	Africa	AsiaPac	AsiaPac %	US	Canada	NA	SA	Americas	Americas %	Overall
SHELL	2009	3655 UK	6.8%	16181	30.1%	15581	2931			7137	25,649	47.7%	7442	3682	11124	797	11921	22.2%	53751
	2001	1675 UK	6.8%	8694	35.3%						9,391	38.1%					6543	26.6%	24628
BP	2009	4721 UK	9.3%	5,598	11.0%	7,244	1,511		7,757	7,159	23,671	46.6%	16,072	583	16655	4,911	21566	42.4%	50835
	2001	5982 UK	23.3%	7,008	27.4%	1,109	2,303		–	1,072	4,484	17.5%	11,141	2,989	14130	–	14130	55.1%	25622
EXXON	2009	9,015 US	13.8%	16,819 (Asia Pacific)	25.7%	Russia/Casplan 3,501		15,329		14,880	33,710	51.5%	9,015	5,883	14898	0	14898	22.8%	65427
	2001	9340 US	28.9%	11185 (Asia Pacific)	34.6%	Russia/Casplan 485		4746		2911	8,332	25.8%	9340	3466	12806		12806	39.6%	32323
TOTAL	2009	258 France	1.0%	7227	28.0%	2523		5028		9620	17,171	66.5%					1421	5.5%	25819
	2001	349 France	2.3%	6190	40.0%	1640		2200		4997	8,837	57.0%					467	3.0%	15494
CHEVRON	2009	11,411 US; 7039 Other; 11,411	26.5%	3281; 3281	7.6%	10,574; 10574	1523; 1523	0; 0	4,043 TCO; 4043	9,071; 9071	23,688; AsiaPac 25211	58.5%	11,411; 11411	629; 629	12040	938 Homca; 1607; 2545	1421; 14584	33.9%	43076
	2001	9,015 US; 3,288 Other; 9,015	44.8%	1755; 1755	8.7%	4,060; 11; 4071	0; 0	0; 0	673 TCO; 673	3,060; 3060	7804	38.8%	9015	655; 655	9670	6 Homca; 867; 873	10543	52.4%	20102

APPENDIX FIVE

The regression equation was generated using Stepwise Analysis and the outputs are:

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Correlations		
		B	Std. Error	Beta			Lower Bound	Upper Bound	Zero-order	Partial	Part
1	(Constant)	.034	.019		1.840	.070	-.003	.072			
	RSTS	.152	.028	.532	5.479	.000	.097	.207	.532	.532	.532
2	(Constant)	-.392	.105		-3.731	.000	-.602	-.183			
	RSTS	.254	.035	.890	7.179	.000	.184	.325	.532	.638	.634
	LOGREV	.072	.017	.510	4.113	.000	.037	.107	-.115	.429	.363
3	(Constant)	-.364	.113		-3.233	.002	-.588	-.140			
	RSTS	.247	.037	.863	6.656	.000	.173	.320	.532	.612	.590
	LOGREV	.065	.020	.464	3.328	.001	.026	.104	-.115	.361	.295
	OilPrice	.000	.000	.073	.729	.468	.000	.001	.181	.084	.065

a. Dependent Variable: ROS

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Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.532ª	.283	.274	.0480496	.283	30.024	1	76	.000
2	.644ᵇ	.415	.400	.0436919	.132	16.916	1	75	.000
3	.648ᶜ	.419	.396	.0438290	.004	.532	1	74	.468

a. Predictors: (Constant), RSTS

b. Predictors: (Constant), RSTS, LOGREV

c. Predictors: (Constant), RSTS, LOGREV, OilPrice

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.543ª	.295	.285	.0476607	.295	31.761	1	76	.000
2	.618ᵇ	.382	.366	.0448988	.088	10.638	1	75	.002
3	.644ᶜ	.415	.392	.0439761	.033	4.180	1	74	.044
4	.644ᵈ	.415	.400	.0436919	.000	.034	1	74	.854

a. Predictors: (Constant), RSTSCUBD

b. Predictors: (Constant), RSTSCUBD, LOGREV

c. Predictors: (Constant), RSTSCUBD, LOGREV, RSTS

d. Predictors: (Constant), LOGREV, RSTS