The evolution of the global energy industry

Introduction

The global energy industry is undergoing unprecedented changes. Faced with steep demand growth in Asia, rising levels of new tight oil and shale gas production in Northern America and increasing pressures from policy makers and consumers to reduce overall carbon emissions and energy intensity, energy firms are challenged to deal with economic uncertainty and greater political interference. Broadly, the widely quoted "trilemma" of providing energy security, affordability and sustainability has become the ultimate yardstick with which policy makers and many industry participants assess capital investments and strategic decisions.

Providing the world's 12,275 million tonnes of oil equivalent of energy each year is an $11 trillion industry (based on $120 per barrel), which equates to about $30 billion a day (OECD/IEA World Energy Outlook 2011). The companies and institutions involved in the energy industry range from some of the world's largest corporations to technology-specific start-ups. Historically, however, it has fallen upon its largest members to burden the greatest responsibilities for supplying the world's seemingly insatiable demand for energy. When the Financial Times (2012) drew up its top 500 publically listed companies in 2012, 78 were energy companies (of which 43 are oil and gas firms). Seminal works such as, for example, by Yergin (2008) and Smil (2008) and academic publications (e.g., Roeber, 1994) provide fascinating insights into the developments occurring in the energy industry, particularly the oil sector.

Regrettably, much less is known about the actual structure and evolution of the global energy industry. Most extant research is based on econometric assessments of levels of demand, supply, prices (e.g., Adelman, 1994; Dahl and Erdogan, 1994; Jensen, 1994), greenhouse gas emissions (Cooper et al., 1999) and GDP and population growth forecasts (e.g., Gerholm, 1998; Mork, 1994). These analyses can offer very quantifiable insights into the relationships between different variables and likely future developments of the industry, its sectors and factors. At the same time, however, they tell us very little about its composition and evolution.

The aim of this research paper is therefore to take a closer look at the world's largest (and inherently, most financially successful) energy companies and to investigate how this industry has developed in order to make predictions about its future. Drawing on data obtained from Platts' annual survey ranking of the Top 250 global energy companies this paper explores the industry's geographical and sectoral changes over the last decade as well as the impact of the volatility induced by the industry's specific contingencies mentioned above.

In doing so, this paper makes two contributions to the literature. It is, to the best of the author's knowledge, the first paper employing these particular independent ranking data to study the longitudinal changes occurring at the global level of the industry. As a result, the paper is able to offer unique findings about its structure and composition. Second, by taking a global systems perspective the paper contributes to our understanding of the forces affecting its evolution. Consequently, through an assessment of the degree of market flexibility for different sectors it allows us to surmise where the industry might be heading.

The next section describes the choice and source of the data and the methods used to analyse them. This is followed by the findings before a final section discusses these findings and concludes.

Methods

To study the evolution of the global energy industry, data were obtained from the annual Platts Top 250 Global Energy Company Rankings™. Although these rankings produced by a commercial entity are a widely respected measure of a company's success in the energy industry, with the exception of using them for sampling purposes (e.g., Jukan et al., 2011; Xun et al., 2011) the rankings themselves have never been subjected to closer scrutiny.

The Platts Top 250 rankings are based on measures of companies' financial performance using four key metrics: asset worth, revenues, profits, and return on invested capital. All companies on the list have assets greater than $4 billion. The fundamental and market data are taken from a database compiled and maintained by S&P Capital IQ., a business line of The McGraw-Hill Companies which Platts is also part of (Platts 2013).

Platts groups the energy companies according to their Global Industry Classification Standard (GICS) code. Each company is assigned to an industry according to the definition of its principal business activity. Both the sectoral classification and the regional identification supplied by Platts are retained for the analysis. Because the survey is global, and because all countries do not share a common financial reporting standard, the information presented is for each company's most recent fiscal year. Since then, material changes to a company's financial health may have occurred. Data for U.S. companies are sourced from Securities and Exchange Commission (SEC) Form 10K (Platts 2013).

The company rankings are derived using a special Platts formula. Each company's numerical ranking for asset worth, revenues, profits, and ROIC are added and assigned a rank of 1 to the company with the lowest total, 2 to the company with the second-lowest total, and so on. Finally, ROIC figures-widely regarded as a driver of cash flow and value-were calculated using the following equation: ROIC = [(Income before extraordinary items) - (Available for common stock)] ÷ (Total invested capital) x 100 where "Income before extraordinary items" is net income less preferred dividends and "Total invested capital" is the sum of total debt, preferred stock (value), minority interest, and total common equity (Platts 2013).

Starting from the earliest available data in 2002 these annual rankings were compiled into one database and for the sample composition analyses the respective annual rankings were included in form of panel data. For the survival analysis data from earlier surveys were backward-matched against the most recent, 2012, survey results. This resulted in a balanced sample of 91 firms consistently present in the rankings between 2002 and 2012 ("survivors").

To obtain a measure of the volatility experienced by these survivors, for every firm a mean ranking for the period 2002 to 2012 is calculated. A firm's rank volatility is then found by

(1) Rank volatility = $(\sum(R(_t) - R(_m))^2)^{0.5}$

where $R(_t)$ = ranking position at t (2002, 2003, … 2012)

$R(_m)$ = mean ranking position for the period 2002 to 2012

For every survivor the resulting value gives an indication about the extent of variation around the mean ranking across time, or perhaps more accurately, the value reflects the average distance from the mean ranking position.

Findings

Starting with the panel data and the annual sample variation by region, the results indicate a broadly balanced composition of the Platts Top 250 across the last decade (figure 1). Generally speaking, though, while the percentage of energy firms from EMAS remains constant at around 26%, the Americas' share of the rankings has decreased from 57% to 45% while Asian companies and firms from the Pacific Rim have increased their share from 18% to 28%. Firms from the Americas reached their peak in 2003 with 60%; firms from EMEA reached theirs in 2006 with 32%.

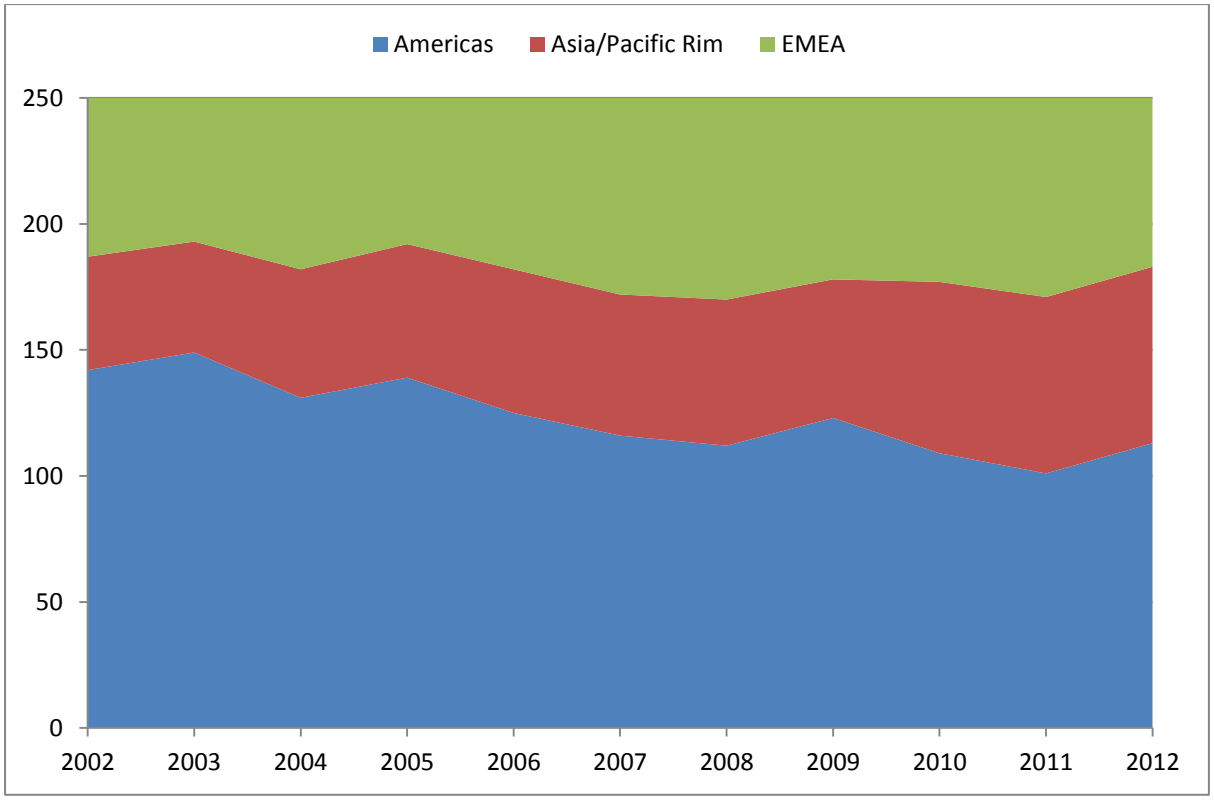

Figure 1: The Platts Top 250 by region

The analysis continues with a look at the distribution of the Top 250 global energy firms by industry sector (figure 2). Here the most dramatic changes are visible with respect to 'Electric Utilities' which have decreased in their prevalence from around 46% in 2002 to 25% in 2012. 'Integrated Oil and Gas' firms and 'Oil and Gas Refining and Marketing' firms managed to hang on to their shares through the years with 14% and 10%, respectively. And while 'Multi-Utilities' and 'Oil and Gas Exploration and Production' firms slightly increased in significance throughout the years, 'Gas Utilities' share fell from 12% to 5% since 2002.

These trends have to be treated with slight caution since Platts introduced two new sector categories in 2005: 'Independent Power Producers and Energy Traders' and 'Coal and Consumable Fuels' firms. After a strong start with 8% the former marginally decreased its prevalence among the Top 250 to about 6%. By contrast, 'Coal and Consumables' have been consistently rising, up from 2% to 6% in 2012.

Focussing on the last three years only, it becomes apparent that the strongest decline in ranking shares was felt by 'Electric Utilities' and 'IPPs and Energy Traders'. This is offset by the steep rise in 'Oil and Gas E&P' firms which doubled their share from 8% in 2010 to 16% in 2012.

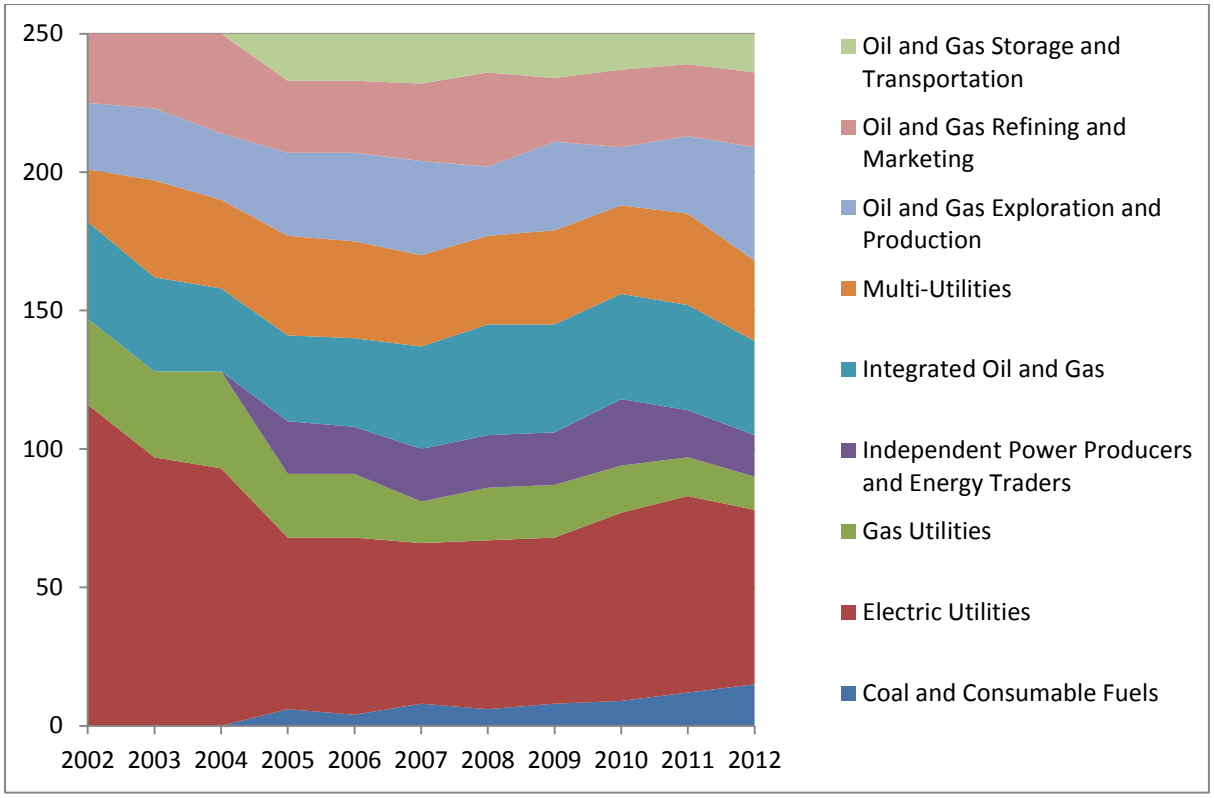

Figure 2: The Platts Top 250 by industry sector

Redrawing the graph with non-stacked lines (and ignoring the idiosyncratic composition before 2005), figure 3 illustrates the greater levels of volatility as part of the Top 250 displayed by 'Electric Utilities', 'O&G E&P' and 'O&G Refining and Marketing' firms over the years. To some degree, there is even some form of counter-cyclicality evident for the latter two sectors.

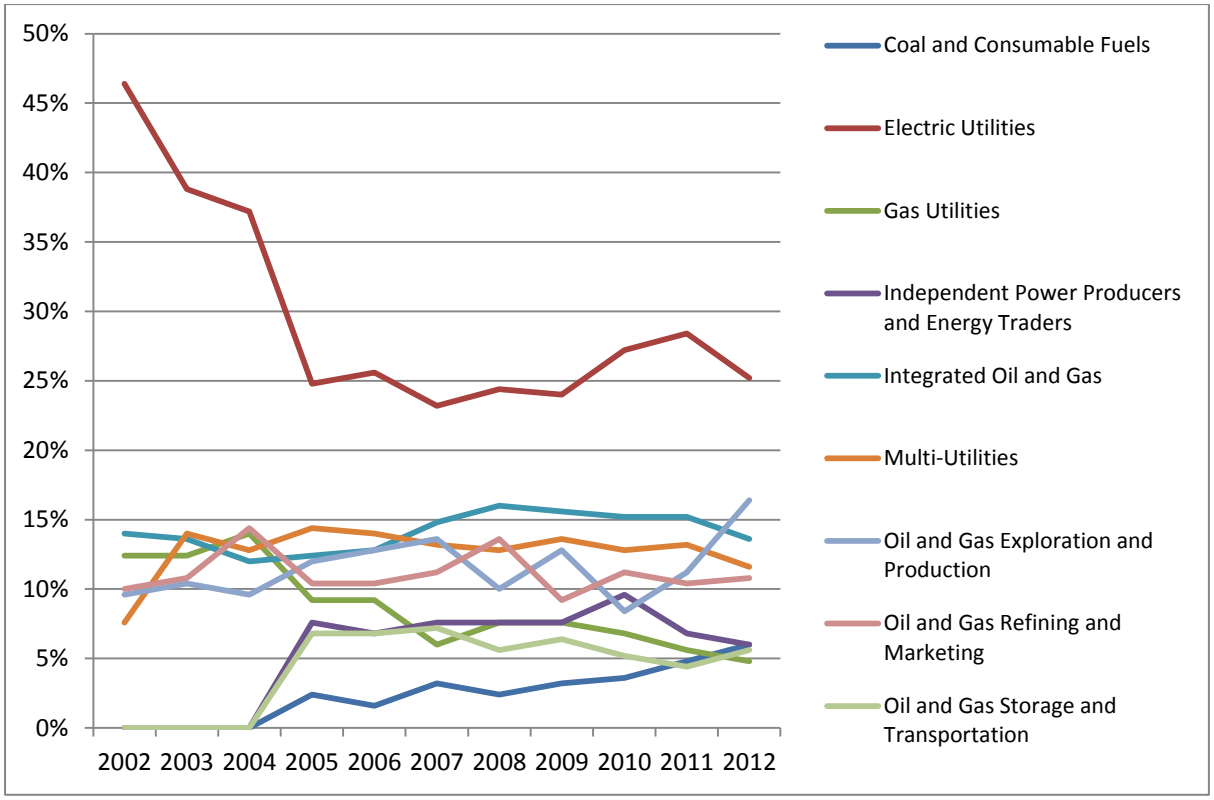

Figure 3: The Platts Top 250 by industry sector

In the next step of the analysis the longitudinal sample is split into its regional constituents. The purpose of this exercise is to better understand the regional variation in terms of sample composition occurring over time (figure 4).

In many ways the Americas sample mirrors that of the full sample, whereby the initial decline of 'Electric Utilities' is offset in 2005 by 'IPPs and Energy Traders', 'O&G Storage and Transportation' and 'Coal and Consumable Fuels' firms. Overall, though, the number of energy firms from the Americas is shrinking as a proportion of the Platts Top 250 sample leading to the gradual decline illustrated in figure 1 above.

Specifically, 'IPPs and Energy Traders' and 'Gas Utilities' have reduced their shares over the years whereas 'Multi-Utilities' and 'Integrated Oil and Gas' firms managed to stagnate in terms of sample share. Since 2010, however, Oil and Gas firms have been rebounding. Particularly, 'Exploration and Production' and 'Storage and Transportation' firms are growing again in numbers. While the share of 'O&G Refining and Marketing' firms still remains only marginal, this sector too is witnessing slight growth.

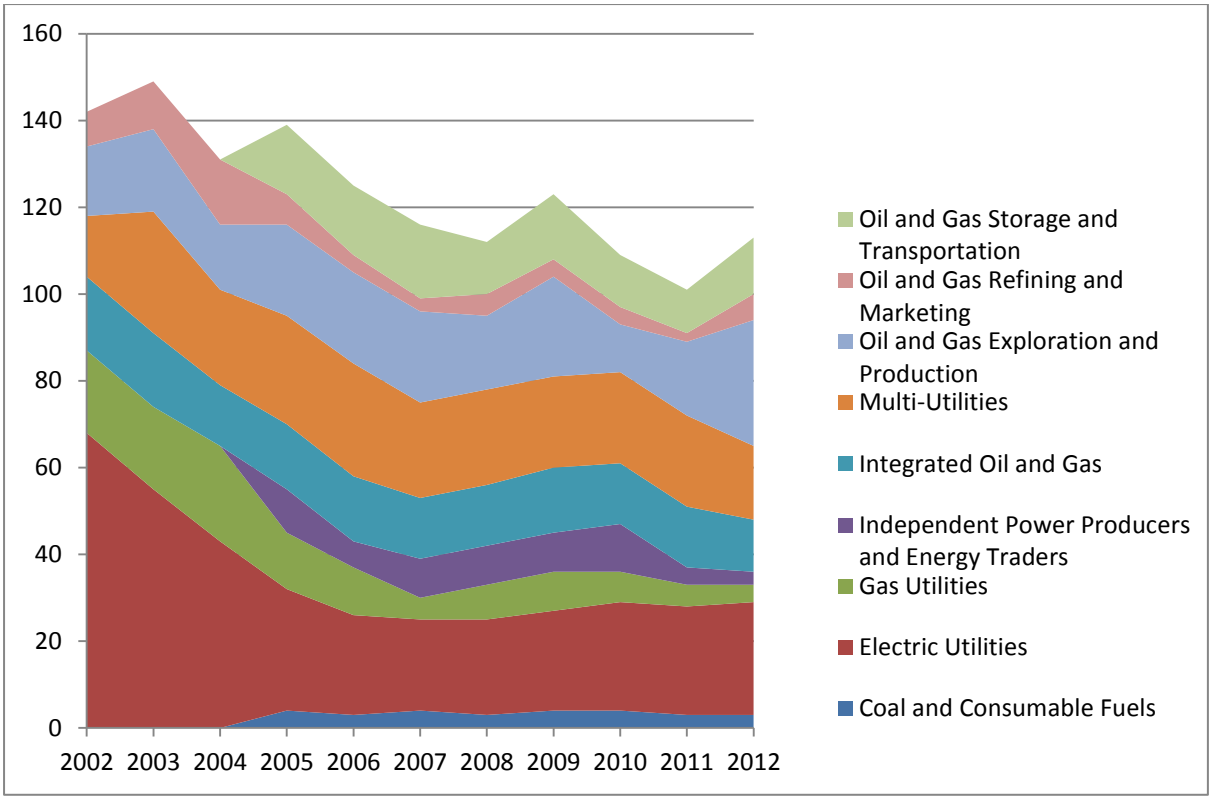

Figure 4: The Platts Top 250 Americas firms by industry sector

Figure 5 demonstrates the longitudinal developments of energy firms within Asia and the Pacific Rim region. There is a clear upwards trend across all sectors as firms from this part of the world increase their foothold inside the Platts Top 250. The strongest growth, undoubtedly, comes from the 'Coal and Consumable Fuels' sector which has grown almost six-fold since 2005, but also 'Independent Power Producers and Energy Traders' have doubled their sample share over time. All other sectors have been surprisingly constant.

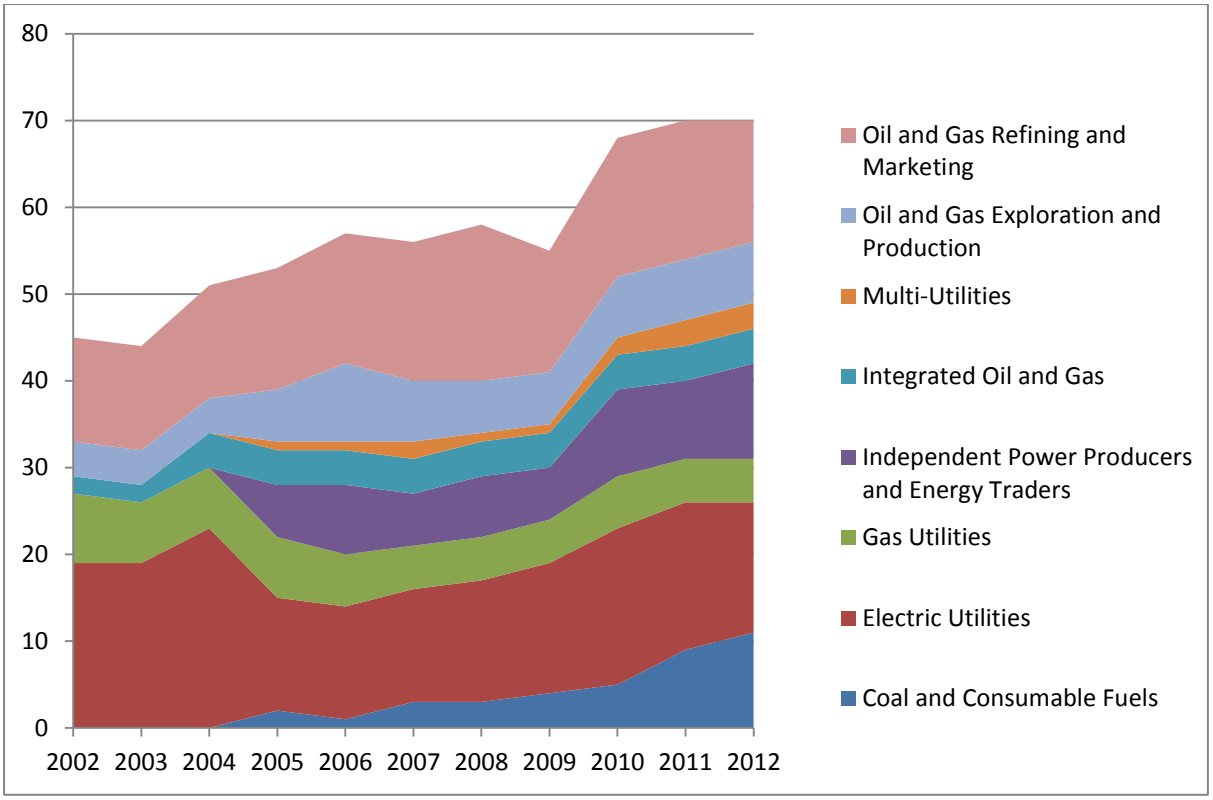

Figure 5: The Platts Top 250 Asia/Pacific rim firms by industry sector

Finally, the picture for EMEA firms over the last decade is comparatively more volatile (figure 6). On the whole, the EMEA region finishes this decade with almost the identical number of energy firms it started with in 2002. Over those years, however, the EMEA region went through what could be labelled as a "roller-coaster ride", constantly growing its share of the sample only then to see this wither away shortly after. Intriguing are the peaks in sample share in 2004, 2008 and 2011. Firms from pretty much all sectors are responsible for this trend except for the near-enough irrelevance of 'Coal and Consumable Fuels' and 'O&G Storage and Transportation' firms.

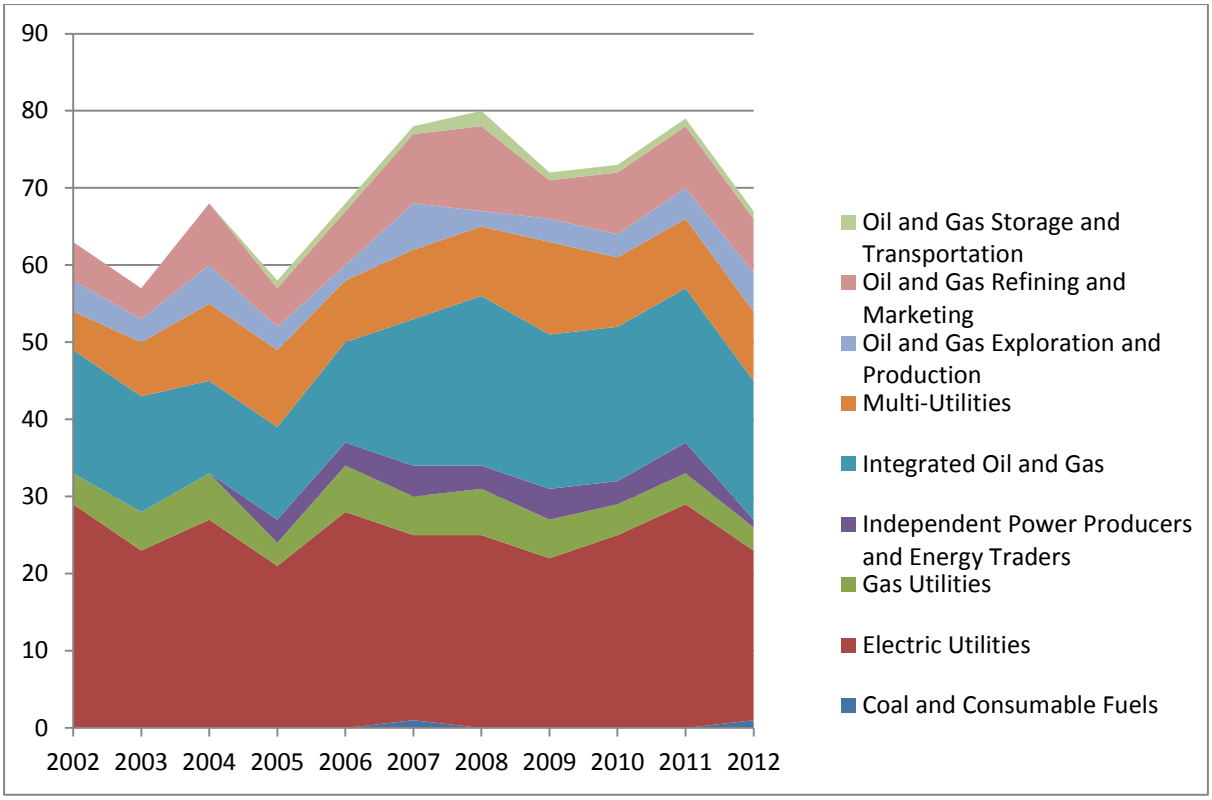

Figure 6: The Platts Top 250 EMEA firms by industry sector

The last part of the analysis concentrates on those companies which have been consistently present throughout the last decade of the Platts' Top 250 global energy firms survey (table 1). There are 91 such "survivors" which tend to share two characteristics: they either come from the 'Electric Utilities' (26%) or 'Integrated Oil and Gas' (22%) sectors, and geographically most of them are headquartered in the Americas region (52%).

Sector	**No change**	**Fall**	**Rise**	**Total**	
Electric Utilities		19	5	24	26%
Gas Utilities		1	5	6	7%
Independent Power Producers and Energy Traders		1	2	3	3%
Integrated Oil and Gas	2	6	12	20	22%
Multi-Utilities	1	10	4	15	16%
Oil and Gas Exploration and Production		4	9	13	14%
Oil and Gas Refining and Marketing		3	5	8	9%
Oil and Gas Storage and Transportation			2	2	2%
Total	3	44	44	91	100%
Region	**No change**	**Fall**	**Rise**	**Total**	
Americas	2	24	21	47	52%
Asia/Pacific Rim		11	13	24	26%
EMEA	1	9	10	20	22%
Total	3	44	44	91	100%

Table 1: Platts Top 250 energy firms survivors

For those 91 survivors there are 44 firms that have improved since 2002 and 44 firms that have slipped in the rankings. Three firms ended up where they started. Looking at the distribution of those surviving firms, 'Electric Utilities' and 'Multi-Utilities' appear to have disproportionately fallen over time in their rankings whereas the surviving 'Gas Utilities', 'Integrated Oil and Gas' firms, Oil and Gas 'E&P' and 'Refining and Marketing' firms all seemed to have been more likely to fare better over the last decade and climb in their ranking positions. The biggest individual changes in rankings between 2002 and 2012 can be observed for the following firms:

- CEZ a.s. climbed 135 places from 189 to 54
- TonenGeneral Sekiyu KK climbed 122 places from 167 to 45
- MOL Hungarian Oil & Gas Co climbed 114 places from 207 to 93
- Anadarko Petroleum Corp fell 169 places from 49 to 218
- Sunoco Inc fell 167 places from 70 to 237
- Tohoku Electric Power Co Inc fell 145 places from 60 to 205

Of course, these comparisons are only snap shots in time and do not communicate what happened at different points in time between 2002 and 2012. In order to provide a little more insight into the variation displayed by different firms and industry sectors throughout the last decade, for every survivor a rank volatility measure is calculated. Figure 7 shows the extent of volatility around the rank averages for different sectors.

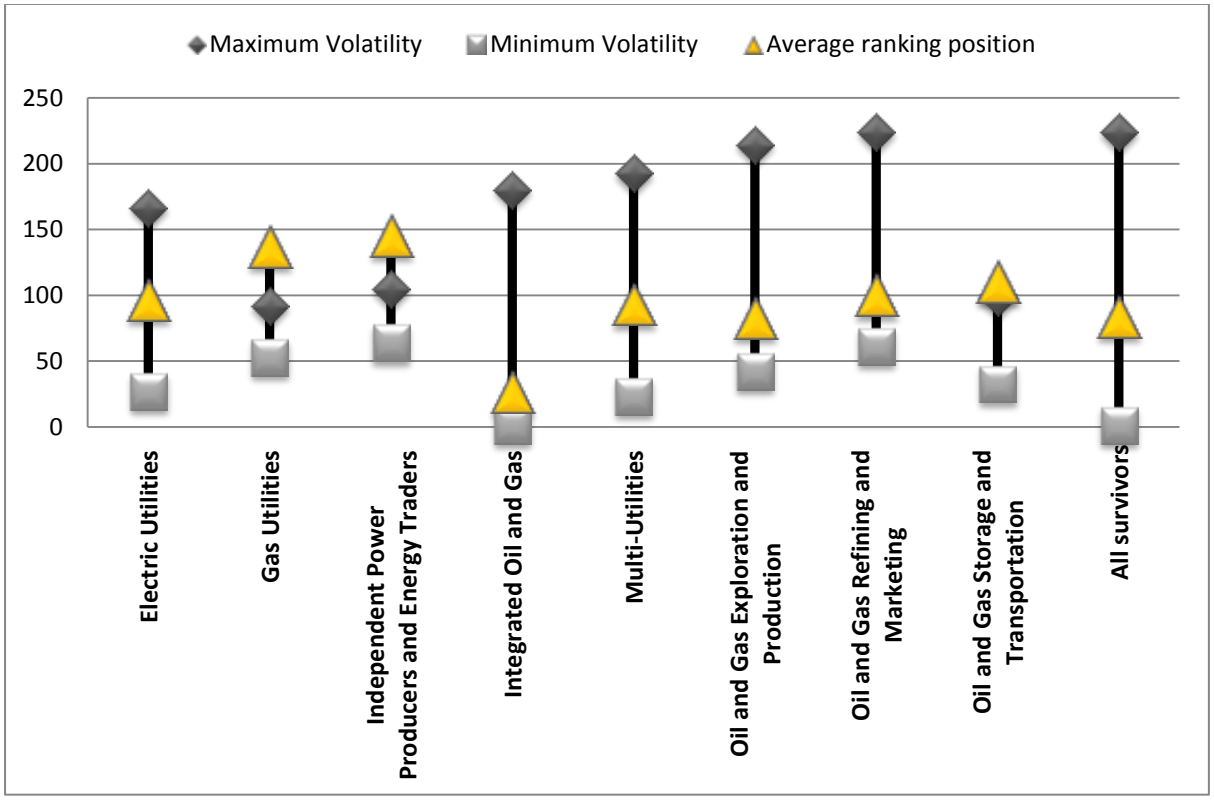

Figure 7: Rank volatility for survivors by industry sector

Figure 7 provides evidence that volatility for the surviving firms differ immensely for different industry sectors. For example, 'Gas Utilities', 'IPPs and Energy Traders' and 'O&G Storage and Transport' firms appear to be far more consistent in their rankings over time. By contrast, the biggest fluctuations are experienced by 'Integrated Oil and Gas' firms, closely followed by O&G 'E&P', 'Refining and Marketing' firms and 'Multi-Utilities'.

Figure 7 also highlights that 'Integrated Oil and Gas' companies tend to have a much lower (in terms of value) average ranking position than all other sectors suggesting that this appears to be the most financially successful sector to be involved in over the last decade. With an average ranking position of almost 150, 'Independent Power Producers and Energy Traders' are faring by far the worst across the sample. Taken together, 'Gas Utilities' and 'IPPs and Energy Traders' are relative poor performers, but at least they are also consistently so. It seems as if these two sectors perform as best as they possibly can (given the competition).

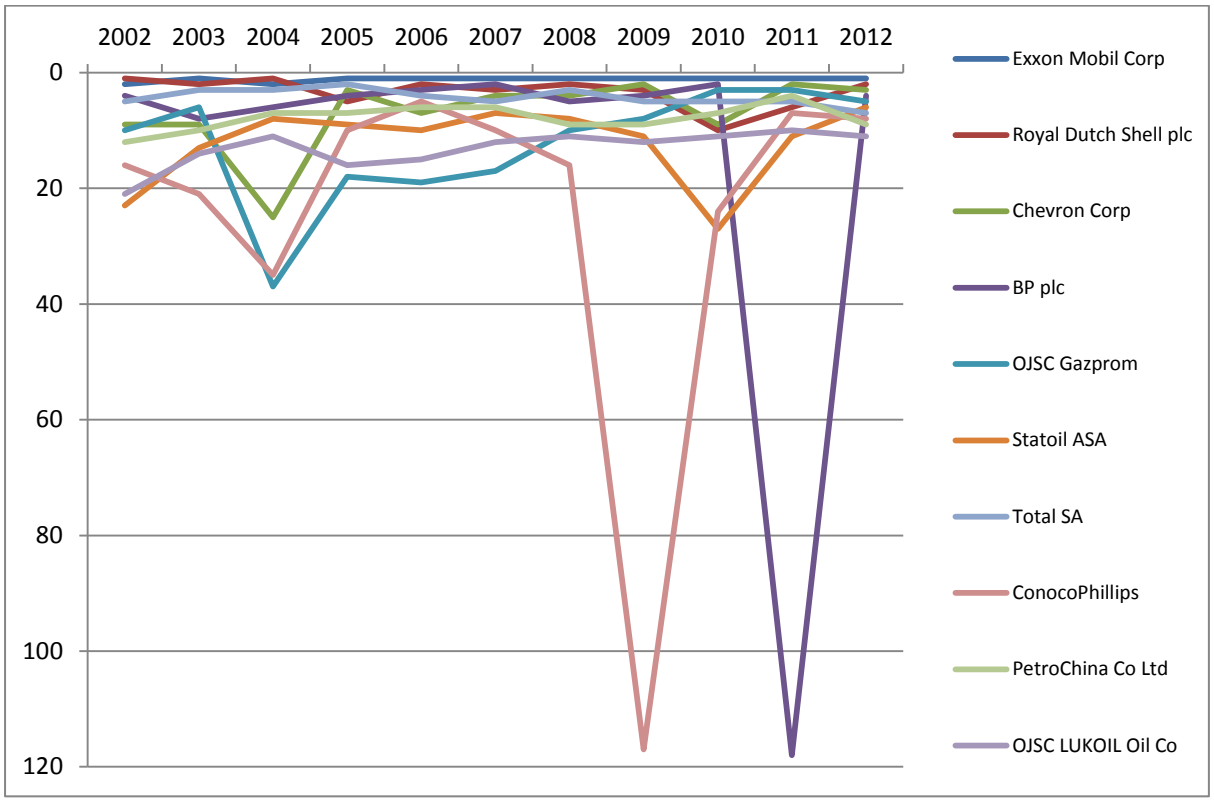

Figure 8: Top 10 surviving energy firms by Platts ranking

Finally, figure 8 shows the longitudinal performance of the ten best firms in 2012. It illustrates how the top surviving firms appear to have a tendency to "cling to the ceiling", or in other words, once they have reached the top of the rankings they remain there in place. ExxonMobil Corporation is the star example having occupied (and continuing to do so) the top spot for nine out of the last 11 rankings. Only BP and ConocoPhilips have experienced major falls in one year of the rankings, but both have also been able to completely recover by 2012.

Discussion and Conclusion

The longitudinal analysis of the Platts Top 250 Global Energy Company Rankings has provided deeper insights into the sectoral and geographical fluctuations among the world's biggest energy firms. On the whole, the findings suggest that the industry relatively quickly adjusts to the changing business environment displaying a significant degree of flexibility. The composition of the biggest and financially most successful energy companies varies over time and given high levels of volatility there is every indication that competitive market forces have a huge impact upon firm's position throughout time.

Across the sample, there is a strong suggestion that fossil fuel centric energy companies are winning back sample (market) share from electricity generators and suppliers. This is perhaps best demonstrated by the linear growth rate of coal and consumables firms. Likewise, oil and gas exploration and production firms are beginning to discover and successfully tap into new production fields, thus increasing pressure on all those firms not directly involved in this part of the market. In spite of all these trajectories, though, the pure 'Gas Utility' business model has been in relative decline.

In terms of the geographical representation, the results indicate that the EMAS region has managed to hold on to its share of firms; meanwhile, the general decline across the Americas is offset by growing numbers of energy firms from Asia and the Pacific Rim. Even so, the recent re-discovery of shale gas and tight oil in Northern America has put a dent in this long-term trend as particularly oil and gas exploration and production firms have been rebounding. The enormous energy demand growth in Asia is reflected in the strong increase in coal and consumable firms as well as IPPs and Energy Traders. By contrast, the relative stability across the EMAS region belies the underlying volatility across the different sectors which, coupled with comparatively stagnating demand growth, have become subjected to wider global market forces.

These findings also support the results from the industry's survivors. Here, too, electric and multi-utilities are coming under pressure from oil and gas firms that have risen in the rankings. This overall level of industry volatility transpires to be double-edged: on the one hand, gas utilities, IPPs and O&G Transport and Storage firms remain relatively more stable in terms of their ranking positions throughout the years. This suggests that their business models are relatively more sheltered from the severe market forces. As a result their financial performance also tends to be comparatively less volatile. On the other hand, multi-utilities, integrated oil and gas firms, and O&G E&P, refining and marketing companies all appear to be likely to undergo huge swings in financial performance resulting in major climbs and falls in the rankings.

Regardless of this industry variation, however, the last finding is perhaps also the most striking: The top of the Top 250 energy firms are very difficult to displace. It seems as if firms' rankings volatility markedly decreases as they approach the upper tiers. Once they

break through a certain ranking barrier, their position seems almost guaranteed. In other words, the world's largest energy firms dominate the rankings and end up consolidating their position through the years. In fact, subsequent statistical analysis indicates that a surviving firm's ranking position and its rank volatility are positively and significantly correlated confirming the notion that as a firm's ranking decreases (i.e., it approaches the top spots), its annual volatility decreases too. Obviously, this has both positive and negative implications, for it means that there is relatively little competition at the top, yet it also implies greater levels of security for the supply of the world's growing energy demand.

In terms of significant geo-political events there have obviously been a number of very important developments over the course of the last decade. The financial crisis starting in 2008 and turning into a continued global economic recession, the Deepwater Horizon oil spill in the Gulf of Mexico in April 2010, the start of the Arab spring in late 2010, and the accident at the nuclear power plant in Fukushima in March 2011 have all, in their own ways, impacted the established ways in which the global energy industry operated. The most specific and obvious effect is BP's instant drop from being in second position in 2010 to 118th in 2011. Even more impressive is its instant comeback to fourth position the following year.

Yet at the global level of the Top 250 firms these events appear to be less obvious. In all likelihood, this is because of two reasons: First, while the events may have shifted some of the underlying dynamics of energy pricing and trading, their impact is absorbed across the constant sample of the 250 biggest firms in a way that is indiscernible. The second reason may be that, given some of these events only occurred relatively recently, it may take time for these events to unfold and become more visible. After all, the rankings only describe which companies have been financially performing well relative to their competitors, but not their absolute levels of performance.

This leads to a short discussion of the limitations of this research. In many ways, the sample represents a unique, but owing to its commercial nature, unverifiable dataset. While this enables consistency throughout the years, it is impossible to conduct more fine-grained analyses required to unearth some of the more detailed aspects of the industry's evolution. For example, the dataset cannot take into account the growth of the renewables energy sector, a constituent which has been constantly on the rise in recent years.

Lastly, this opens up the space to consider some of the macro-level trends arising from this analysis. As was done throughout this paper, it is assumed that the energy industry is indeed just one global industry when in fact there are good arguments to claim that the industry remains fragmented by geographical regions, sectors, political and pricing regimes, business models, and economic and financial conditions.

Nevertheless, when purely measured on the basis of financial performance as is done in the Platts rankings, we can conclude the following trends for the beneficiaries of the global energy industry:

- The general rise of the Asian market but also a re-emergence of the Americas
- Greater strategic focus on fossil fuels rather than electricity and utilities
- An inherent tendency towards upstream exploration and production
- Less specialisation in the downstream sectors (i.e., gas utilities, IPPs)

Of course, the conclusions have to be treated with caution since rankings reflect financial performance from the past. In that sense, they are relatively ill-suited for making predictions. Yet, in the context of the many factors impinging on energy companies' strategies, these trends provide some understanding of the areas where energy companies are currently successful and where we can see further entrenchment, at least in the near future.

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